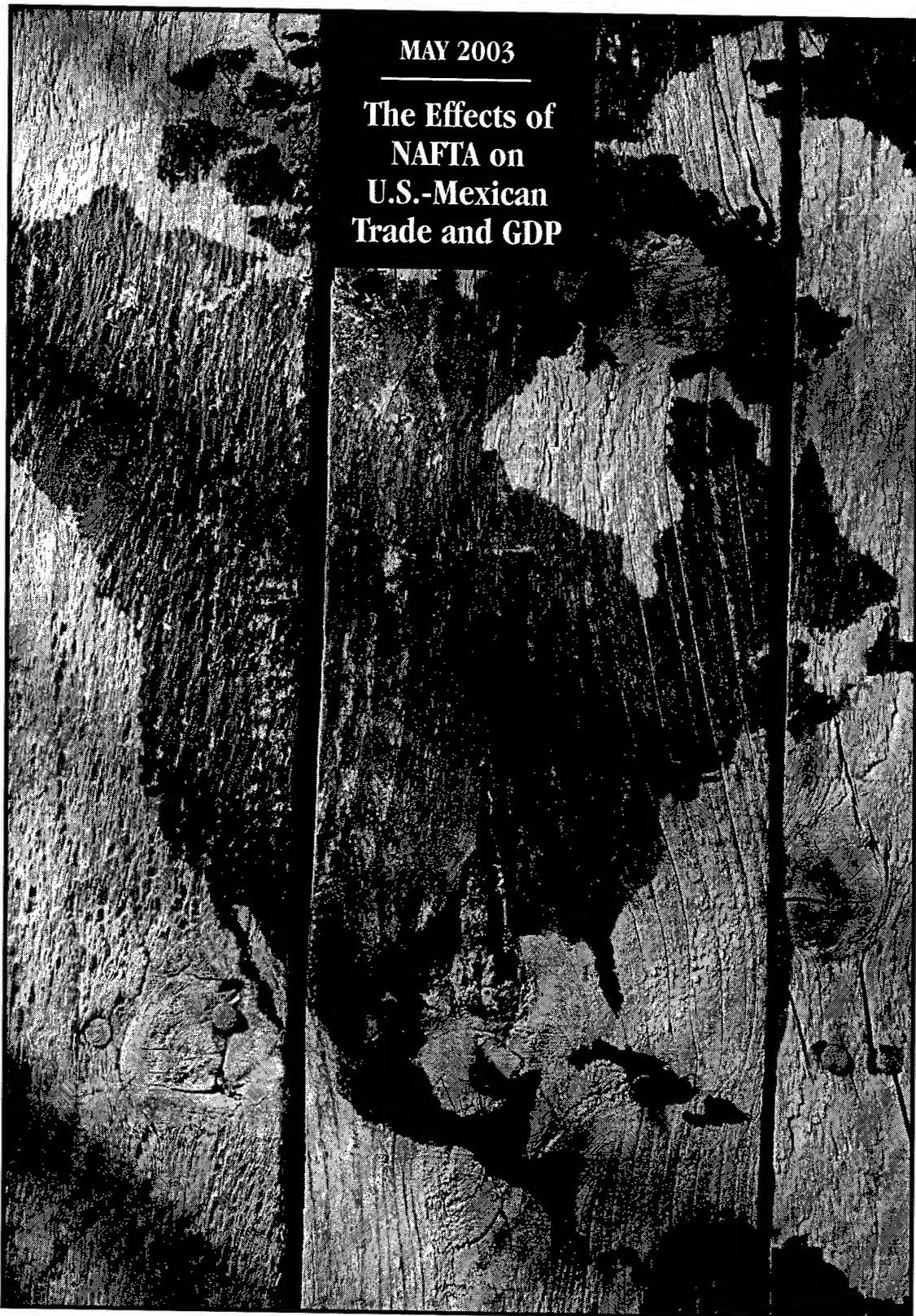
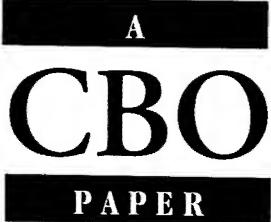


**MAY 2003**

**The Effects of  
NAFTA on  
U.S.-Mexican  
Trade and GDP**





# The Effects of NAFTA on U.S.-Mexican Trade and GDP

May 2003

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## Notes

Unless otherwise indicated or apparent, all time-series values in this paper are quarterly and are seasonally adjusted. Similarly, unless otherwise indicated, all rate series—such as exports in billions of dollars or gross domestic product—are annual rates.

Data series for exports and imports were constructed from three compilations of trade data from the Bureau of the Census: the Interactive Tariff and Trade Data Web on the Web site of the International Trade Commission ([www.usitc.gov](http://www.usitc.gov)); *Direction of Trade Statistics*, published by the International Monetary Fund; and the Haver Analytics database. The export values used are the free alongside ship (f.a.s.) values of total exports. The import values used are the customs values of general imports.

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## Preface

**T**

he North American Free Trade Agreement (NAFTA) went into effect on January 1, 1994, creating a free-trade area encompassing the United States, Canada, and Mexico. Since then, agreements have been proposed—and, in some cases, negotiations begun or even completed—for a Free Trade Area of the Americas and free-trade areas with a number of other countries of varying degrees of development. Consequently, assessing the effects of NAFTA is relevant to current debates about trade policy.

This Congressional Budget Office (CBO) paper—prepared at the request of the Chairman of the Senate Committee on Finance—examines aggregate U.S.-Mexican trade in goods in the first eight years after NAFTA went into effect and how it has been affected by the agreement and by other factors. The paper provides quantitative estimates of the effects of NAFTA on that trade and of the resulting effects on U.S. gross domestic product. (The paper focuses on U.S. trade with Mexico because U.S. trade with Canada had already been substantially liberalized in accordance with the Canada-United States Free Trade Agreement before NAFTA went into effect.)

Bruce Arnold of CBO's Microeconomic and Financial Studies Division prepared the paper under the direction of Roger Hitchner and David Moore. Charles Capone, Robert Dennis, Tracy Foertsch, Douglas Hamilton, Juann Hung, Rob McClelland, and Thomas Woodward of CBO provided valuable comments, as did Gary Hufbauer of the Institute for International Economics and David Gould of the Institute of International Finance, Inc.

Christian Spoor edited the paper, and Christine Bogusz proofread it. Kathryn Winstead prepared the paper for publication, Lenny Skutnik produced the printed copies, and Annette Kalicki prepared the electronic versions for CBO's Web site.

Douglas Holtz-Eakin  
Director

May 2003

**Summary** *ix*

**1**

**Introduction** *1*

What Is NAFTA? *1*

How Should the Success or Failure of a Free-Trade  
Agreement Be Measured? *2*

How Has U.S.-Mexican Trade Changed Over Time? *6*

**2**

**Other Influences on U.S.-Mexican Trade Besides NAFTA** *11*

Domestic U.S. Factors *11*

Mexican Economic Development *12*

Imports of Crude Oil from Mexico *12*

The Exchange Rate Between the Dollar and the Peso *12*

The Mexican Business Cycle *13*

**3**

**The Effects of NAFTA** *17*

The Effects of NAFTA on U.S.-Mexican Trade *17*

The Effects of NAFTA on U.S. GDP *21*

A Few Notes About the Results *22*

Consistency of CBO's Results with Other Estimates  
in the Literature *23*

**Appendix A**

CBO's Model of U.S.-Mexican Trade *27*

**Appendix B**  
**Assumptions for the Alternative Scenario**  
**in Chapter Three 37**

**Appendix C**  
**Results from the Model Estimated Using**  
**Only Pre-NAFTA Data 39**

**Appendix D**  
**Effects of the Assumption About the Real Exchange**  
**Rates and Incomes in the Absence of NAFTA 49**

**Tables**

1.	Effects of NAFTA on U.S. Goods Trade with Mexico	19
2.	Effects of NAFTA on U.S. Gross Domestic Product	22
3.	CBO's Estimates of the Effects of NAFTA Compared with Others in the Literature	24
A-1.	Estimates and Statistics for Long-Term Equilibrium Equations for U.S.-Mexican Trade	34
A-2.	Estimates and Statistics for Dynamic Error-Correcting Equations for U.S.-Mexican Trade	35
C-1.	Effects of NAFTA on U.S. Goods Exports to and Imports from Mexico by CBO's Standard and Alternative Methodologies	44
C-2.	Effects of NAFTA on the U.S. Goods Trade Balance with Mexico by CBO's Standard and Alternative Methodologies	46
C-3.	Effects of NAFTA on U.S. Gross Domestic Product by CBO's Standard and Alternative Methodologies	47

**Figures**

S-1.	U.S. Trade in Goods with Mexico	xi
S-2.	Real Exchange Rates for U.S. Trade in Goods with Mexico	xii
S-3.	Mexican Industrial Production and Real Gross Domestic Product	xii
S-4.	U.S. Balance of Trade in Goods with Mexico Under Alternative Scenarios	xiv
1.	Tariff Rates on U.S.-Mexican Trade Before and After NAFTA	3
2.	U.S. Goods Trade with Mexico	8
3.	Mexico's Share of U.S. Goods Trade with the World	8
4.	U.S. Goods Trade Balance with Mexico	9
5.	U.S. Goods Trade Balance with Mexico and with the World	10

6.	U.S. Goods Trade with Mexico as a Share of U.S. Goods Trade with the World	10
7.	Crude Oil as a Share of U.S. Goods Imports from Mexico	12
8.	Real Exchange Rates for U.S. Goods Trade with Mexico	13
9.	Mexican Industrial Production and Real Gross Domestic Product	13
10.	Net Foreign Investment in Mexico	14
11.	U.S. Goods Trade with Mexico with and Without NAFTA	18
12.	U.S. Goods Trade Balance with Mexico Under Alternative Scenarios	20
B-1.	Real Exchange Rate for U.S. Goods Exports to Mexico Under Alternative Scenarios	37
B-2.	Mexican Industrial Production Index Under Alternative Scenarios	38
B-3.	Real U.S. GDP Under Alternative Scenarios	38
C-1.	U.S. Goods Trade with Mexico by CBO's Alternative Methodology	41
C-2.	U.S. Goods Trade Balance with Mexico by CBO's Alternative Methodology	45
C-3.	U.S. Goods Trade Balance with Mexico Under Alternative Scenarios by CBO's Alternative Methodology	46
C-4.	Actual U.S. Goods Trade Balance with Mexico Under Alternative Scenarios by CBO's Alternative Methodology	47

**Boxes**

1.	NAFTA and Foreign Investment	4
2.	The Effects of Trade Creation and Trade Diversion	5
3.	Trade Balances with Individual Countries Versus the Balance with the Entire World	7



## Summary

**T**

he North American Free Trade Agreement (NAFTA), which took effect on January 1, 1994, called for the phasing out of virtually all restrictions on trade and investment flows among the United States, Canada, and Mexico over 10 years (with a few of the most sensitive restrictions eliminated over 15 years). The United States and Canada were already well into the elimination of the barriers between themselves in accordance with the Canada-United States Free Trade Agreement, so the main new feature of NAFTA was the removal of the barriers between Mexico and those two countries.

Now, more than eight years later, most artificial impediments to trade and investment between the United States and Mexico have been dismantled. In 2001, 87 percent of imports from Mexico entered the United States duty free. The average duty on the remainder was only 1.4 percent, for an overall average tariff rate of 0.2 percent, down from 2.1 percent in 1993. The overall average Mexican tariff rate in 2001 was only 1.3 percent, down from 12 percent in 1993. Enough time has passed and enough of NAFTA's trade and investment liberalization has been phased in that any substantial effects of the agreement should be evident by now.

This paper assesses the effects of NAFTA on overall levels of trade in goods between the United States and Mexico and on U.S. gross domestic product (GDP).<sup>1</sup> Such an assessment is important not only for its own sake but also because of its relevance to other proposed U.S. free-trade areas with developing countries. Since NAFTA went into

1. Lack of data and other considerations make analyzing trade in services problematic, and as noted earlier, almost all barriers to U.S.-Canadian trade had already been removed (or were scheduled for removal within a few years) before NAFTA went into effect.

effect, proposals have been made and, in some cases, negotiations have begun (or even been completed) for a Free Trade Area of the Americas and for free-trade areas with Chile, Central America, Southern Africa, Morocco, Singapore, and various other countries of the Association of Southeast Asian Nations.

The challenge in assessing NAFTA is to separate its effects from the effects of other factors that have influenced trade between the United States and Mexico. Those factors include the considerable economic and political turmoil that occurred in Mexico in the early post-NAFTA years—turmoil that, for the most part, was unrelated to the agreement—and the long U.S. economic expansion that lasted throughout most of the 1990s. The Congressional Budget Office (CBO) used a statistical model of U.S.-Mexican trade to separate out the effects of those factors and reached the following conclusions:

- U.S. trade with Mexico was growing for many years before NAFTA went into effect, and it would have continued to do so with or without the agreement. That growth dwarfs the effects of NAFTA.
- NAFTA has increased both U.S. exports to and imports from Mexico by a growing amount each year. Those increases are small, and consequently, their effects on employment are also small.
- The expanded trade resulting from NAFTA has raised the United States' gross domestic product very slightly. (The effect on Mexican GDP has also been positive and probably similar in magnitude. Because the Mexican economy is much smaller than the U.S. economy, however, that effect represents a much larger percentage increase for the Mexican economy.)

Some observers look at NAFTA's effects on the U.S. balance of trade with Mexico (the difference between the values of exports and imports) as an indication of the economic benefit or harm of the agreement. The balance of trade dropped substantially after NAFTA took effect and has declined further in more recent years, leading some people to conclude that NAFTA has been bad for the U.S. economy.

However, changes in the balance of trade with a partner country are a poor indicator of the economic benefit or harm of a trade agreement. A better indicator is changes in the levels of trade. Increases in trade—both exports and imports—lead to greater economic output because they allow each nation to concentrate its labor, capital, and other resources on the economic pursuits at which it is most productive relative to other countries. Benefits from the greater output are shared among the countries whose trade increases, regardless of the effects on the trade balance with any particular country. Such effects do not translate into corresponding effects on the balance of trade with the world as a whole; for a country as big as the United States, that balance is largely unaffected by restrictions on trade with individual countries the size of Mexico. Moreover, even declines in a country's trade balance with the world have little net effect on that country's output and employment because the immediate effects of those declines are offset by the effects of increased net capital inflows from abroad that must accompany those declines.<sup>2</sup>

Furthermore, CBO's analysis indicates that the decline in the U.S. trade balance with Mexico was caused by economic factors other than NAFTA: the crash of the peso at the end of 1994, the associated recession in Mexico, the rapid growth of the U.S. economy throughout most of the 1990s, and another Mexican recession in late 2000 and 2001. NAFTA, by contrast, has had an extremely

---

2. By an accounting identity derivable directly from the definitions of the economic terms, net capital inflows must increase by the same amount that the trade balance declines. More precisely, changes in the net inflow of foreign investment must be equal in magnitude and opposite in sign to changes in the current-account balance, which is a broad measure of the trade balance that includes trade in services and income flows on foreign investments in addition to trade in goods. See Congressional Budget Office, *Causes and Consequences of the Trade Deficit: An Overview* (March 2000).

small effect on the trade balance with Mexico, and that effect has been positive in most years.

Besides increasing trade, NAFTA has had a substantial effect on international investment. It has done so for at least two reasons. First, it eliminated a number of Mexican restrictions on foreign investment and ownership of capital. Second, by abolishing tariffs and quotas, NAFTA made Mexico a more profitable place to invest, particularly in plants for final assembly of products destined for the United States. However, it is difficult—if not impossible—to separate the increases in foreign investment in Mexico that resulted from NAFTA from the increases caused by prior liberalization of Mexico's trade and other economic policies. Modeling such investment flows and their effects on the U.S. economy is similarly difficult. Consequently, this paper does not examine NAFTA's effects on investment in any detail but instead concentrates on the agreement's effects on trade.

## How Has U.S.-Mexican Trade Changed Over Time?

For Mexico, the North American Free Trade Agreement was only part of a much larger program of economic liberalization extending back to the mid-1980s. That program included joining the General Agreement on Tariffs and Trade in 1986; lowering the average tariff rate from 27 percent in 1982 to 12 percent (or 10 percent as calculated by some sources) in 1993—a larger drop than remained to be accomplished by NAFTA's elimination of tariffs; reducing import licensing requirements and restrictions on foreign investment; privatizing and deregulating various state enterprises, including banks; and implementing an inflation-reduction program, which brought inflation down from a peak of 187.8 percent in 1987 to 6.4 percent at about the time that NAFTA went into effect.

Since Mexico began its program of economic reform and trade liberalization, its trade with the United States—both exports and imports—has grown substantially. That growth started long before NAFTA and has continued since then. A year after NAFTA went into effect, the U.S. trade balance with Mexico dropped suddenly from near zero to a substantial deficit. It recovered partially over the

next few years but then began declining again to record deficits. That decline has continued ever since.

### Changes in Exports and Imports

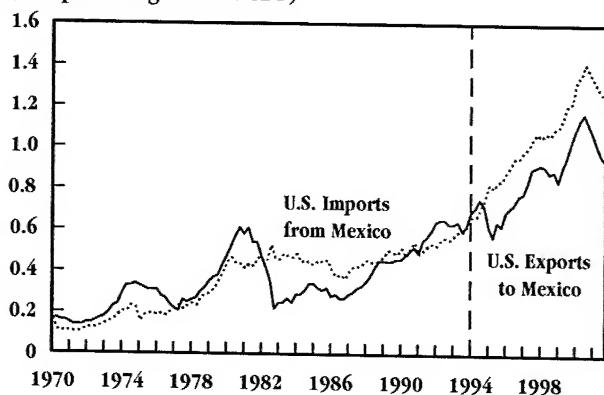
Over the past two decades, U.S. trade with Mexico has increased dramatically. In dollar terms, exports of goods to Mexico rose by almost a factor of six between late 1982 and late 1993 (just before NAFTA), and they nearly tripled again by the third quarter of 2000 before declining during the recent recession in the United States and Mexico. That growth was not smooth: a year after NAFTA took effect, exports dropped by 21.4 percent in just over two quarters before they resumed their climb. U.S. imports of goods from Mexico almost tripled between late 1982 and late 1993 and then more than tripled again by the third quarter of 2000, at which point they too fell back during the recession. Even with exports and imports expressed as percentages of GDP, growth was substantial (see *Summary Figure 1*).

The growth was sufficiently large and rapid that Mexico's share of U.S. trade with the world rose considerably. At the end of 1982, exports destined for Mexico represented

### Summary Figure 1.

#### U.S. Trade in Goods with Mexico

(As a percentage of U.S. GDP)



Source: Congressional Budget Office using data on trade from the Bureau of the Census and data on gross domestic product from the Bureau of Economic Analysis.

Note: The dashed vertical line marks the beginning of the North American Free Trade Agreement on January 1, 1994.

3.7 percent of all U.S. exports of goods. In the last quarter before NAFTA went into effect, that figure stood at 8.8 percent, and it reached 14.2 percent by the end of 2001. Similarly, imports from Mexico rose from 4.6 percent of all U.S. imports of goods at the end of 1986 (the end of a decline resulting from a crash in crude oil prices) to 7.1 percent just prior to NAFTA and then to 11.8 percent by the end of 2001. Before NAFTA, Mexico was the third-largest market for U.S. exports and the third-largest supplier of U.S. imports. By 2001, it was second in both categories.

### Changes in the Trade Balance

The balance of trade in goods with Mexico has declined substantially since NAFTA went into effect. Its descent actually started almost two years before NAFTA, but the balance did not decline much until a year after the agreement went into force. It recovered slightly from 1995 through 1998 before resuming its descent.

The United States also experienced a growing deficit in trade in goods with the world as a whole during that period and for many years beforehand; Mexico's share of that deficit has been smaller than might be expected from the country's size as a U.S. trading partner. Indeed, for almost all of the past 17 years, Mexico's share of the U.S. trade deficit with the world has been smaller than its shares of U.S. exports and imports (the only exception being the seven quarters from the beginning of 1995 through the third quarter of 1996). Correspondingly, Mexico's ranking on the list of trading partners with which the United States has the largest deficits has been lower than its rankings on the lists of top U.S. export markets and import suppliers. Nevertheless, the large decline in the trade balance since NAFTA took effect has led critics to suspect that the agreement significantly worsened, if not caused, the trade deficit with Mexico.

### Other Factors Besides NAFTA That Have Affected U.S. Trade with Mexico

Numerous factors other than NAFTA have substantially influenced U.S.-Mexican trade. Four events that occurred after the agreement went into effect are particularly important:

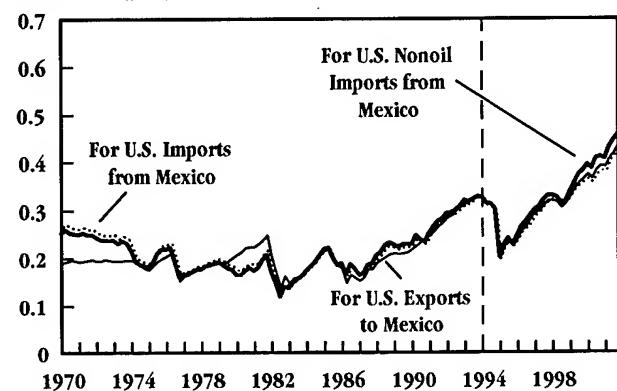
- A sudden major decline in the value of the peso at the end of 1994 (which reduced U.S. exports to Mexico and increased U.S. imports from Mexico),
- An associated harsh Mexican recession in 1995 (which lowered Mexico's demand for all countries' exports, including those of the United States),
- The long U.S. economic expansion that lasted through most of the 1990s (which increased U.S. demand for imports from all countries), and
- Recessions in the United States and Mexico in late 2000 and 2001 (which reduced Mexican demand for U.S. and other countries' exports and U.S. demand for imports from all countries).

The prolonged U.S. expansion and the U.S. and Mexican recessions in late 2000 and 2001 are clearly unrelated to

### Summary Figure 2.

#### Real Exchange Rates for U.S. Trade in Goods with Mexico

(In dollars per peso)



Source: Congressional Budget Office using data on nominal exchange rates and Mexican prices from International Monetary Fund, *International Financial Statistics*, and data on prices and quantities of U.S. traded goods from the Bureau of the Census, Bureau of Labor Statistics, Bureau of Economic Analysis, and Energy Information Administration.

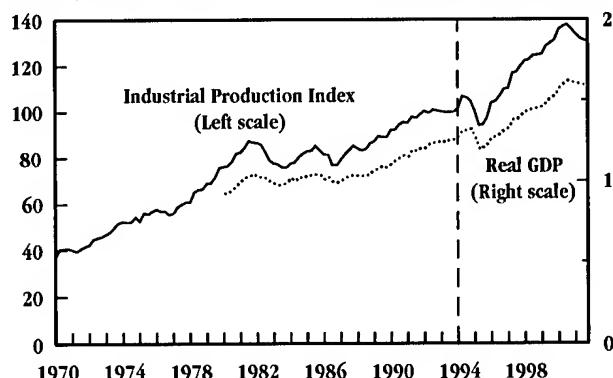
Notes: The effects of Mexican inflation over time were removed using the Mexican wholesale price index. The effects of U.S. inflation over time were removed using price indices for U.S. exports to and imports from Mexico that CBO constructed from the data sources cited above.

The dashed vertical line marks the beginning of the North American Free Trade Agreement on January 1, 1994.

### Summary Figure 3.

#### Mexican Industrial Production and Real Gross Domestic Product

(Index, 1993 = 100) (Trillions of 1993 Pesos)



Source: International Monetary Fund, *International Financial Statistics*.

Note: The dashed vertical line marks the beginning of the North American Free Trade Agreement on January 1, 1994.

NAFTA, and their effects must be removed from the observed fluctuations in U.S.-Mexican trade to isolate the effects of NAFTA. The peso crash and ensuing Mexican recession, however, merit further discussion. Both were severe. From the last quarter of 1994 to the first quarter of 1995, the real value of the peso (the value adjusted for inflation in the United States and Mexico) dropped by one-third (see *Summary Figure 2*). In the recession, seasonally adjusted real Mexican GDP declined by 9.7 percent (see *Summary Figure 3*). Because of their magnitudes, both of those events could be expected to have had a substantial influence on trade. Their occurrence just a year after NAFTA went into effect might lead some people to suspect that the agreement played a role in causing them or making them worse. However, that is not the case.

A number of factors converged to cause the financial crisis that led to the peso crash and Mexican recession of the mid-1990s. They include the market's nervousness about the historically high real value of the peso; considerable political turmoil in 1994 (an armed rebellion in the state of Chiapas, a presidential election and change of administration, two major political assassinations, and the resignation of the Deputy Attorney General claiming a coverup in the investigation of one of the assassinations); rising interest rates in the United States; well-intended Mexican

government policies that ended up exacerbating the crisis; and the market's memories of past Mexican government actions in somewhat similar situations that had hurt investors.

In response to those factors, net foreign investment in Mexico plummeted in 1994, causing interest rates to rise and putting severe downward pressure on the value of the peso. The Mexican central bank ran out of the foreign exchange reserves required to keep the peso from falling and was forced first to devalue it and then to let it float. Interest rates skyrocketed, the government and private sector were unable to borrow from abroad, and the country went into a severe recession.

NAFTA had little to do with that course of events. Consequently, the effects of the peso crash and Mexican recession must be removed from the observed fluctuations in U.S.-Mexican trade along with the effects of the other factors listed earlier in order to isolate the effects of NAFTA.

## **The Effects of NAFTA on U.S. Trade with Mexico**

To disentangle the effects of NAFTA from those of other influential factors, CBO constructed a statistical model of U.S. trade with Mexico. Simulations from the model indicate that NAFTA has slightly increased U.S. exports to and imports from Mexico of goods and that the vast bulk of the growth and fluctuation of exports and imports has occurred for reasons other than the agreement. On the basis of those simulations, CBO estimates that roughly 85 percent of the increase in U.S. exports of goods to Mexico between 1993 and 2001, and 91 percent of the increase in U.S. imports of goods from Mexico over the same period, would have taken place even if NAFTA had not been implemented. In addition, the major fluctuations in exports and imports would have been similar to what actually occurred.

By CBO's estimates, NAFTA increased U.S. exports to Mexico by 2.2 percent (\$1.1 billion) in 1994—an effect that rose gradually, reaching 11.3 percent (\$10.3 billion) in 2001. Similarly, the agreement boosted imports from

Mexico by amounts that rose from 1.9 percent (\$0.9 billion) in 1994 to 7.7 percent (\$9.4 billion) in 2001.

Relative to the size of the economy, the increases in exports never exceeded 0.12 percent of U.S. GDP, and the increases in imports never exceeded 0.11 percent of U.S. GDP. The effects were more significant for the much smaller Mexican economy, however. The increase in U.S. exports to Mexico represented 1.9 percent of Mexican GDP in 2001, and the increase in U.S. imports from Mexico equaled 1.7 percent of Mexican GDP.

Although NAFTA's effects on the balance of trade with Mexico are unimportant economically, they are of considerable interest politically. The perception that the agreement is responsible for the decline in that balance since 1993 has contributed to negative attitudes toward NAFTA and toward other proposals for trade liberalization. However, simulations from CBO's model indicate that NAFTA has had an extremely small effect on the balance of trade in goods with Mexico in all of the years since the agreement went into force—and a positive effect in most of those years. The largest effects indicated by the simulations are increases of \$0.9 billion, \$1.3 billion, and \$0.9 billion in 1999, 2000, and 2001, respectively—the most recent three years in the simulation. The effects for all years are less than 0.02 percent of GDP in magnitude.

The reason for the substantial fall in the trade balance with Mexico since NAFTA took effect lies primarily in fluctuations of the U.S. and Mexican business cycles. The balance went abruptly into substantial deficit at the end of 1994 and the beginning of 1995 because of the severe Mexican recession and, to a much lesser extent, the peso crash. The recession significantly reduced Mexican demand for U.S. exports, and the peso crash further reduced that demand slightly and increased U.S. imports from Mexico slightly.

Those factors affected Mexico's trade with other countries more than its trade with the United States. Mexican imports from the rest of the world fell by 17.4 percent between 1994 and 1995, whereas its imports from the United States declined by 6.3 percent. Likewise, its exports to the rest of the world rose by 46.2 percent over the same period, whereas its exports to the United States increased by 28.0 percent.

In 1996, Mexican demand for U.S. exports began to recover along with the peso and the Mexican economy. However, U.S. imports from Mexico (as well as from other countries) began to rise in response to the economic expansion in the United States. Consequently, the U.S. trade balance with Mexico did not recover much, and in fact, it began to decline further in 1998. In 2001, the U.S. recession caused imports from Mexico to fall, but a coinciding Mexican recession caused U.S. exports to Mexico to fall even more, so the trade balance continued to decline.

Projections from CBO's model indicate that if the peso crash, the associated Mexican recession, the prolonged U.S. economic boom, and the U.S. and Mexican recessions in late 2000 and 2001 had not occurred, U.S. trade with Mexico would have remained near balance throughout the entire post-NAFTA period (see *Summary Figure 4*).

## The Effects of NAFTA on U.S. GDP

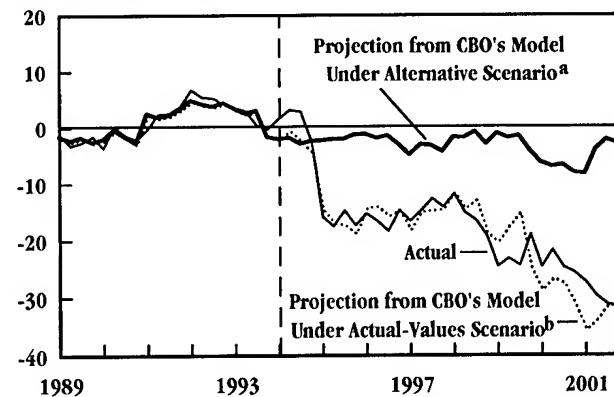
Precisely estimating the effects of NAFTA on U.S. GDP involves assessing how much of the increase in imports from Mexico that was caused by NAFTA merely displaces imports from other countries rather than adding to them. Such an assessment is beyond the scope of this paper. Other studies have tackled that issue, however, and by combining their results with CBO's estimates of the effects of NAFTA on U.S. trade, it is possible to conclude that NAFTA has increased annual U.S. GDP, but by a very small amount—probably no more than a few billion dollars, or a few hundredths of a percent.

The effect on Mexican GDP has also been positive and probably similar to the effect on U.S. GDP in dollar terms

### Summary Figure 4.

#### U.S. Balance of Trade in Goods with Mexico Under Alternative Scenarios

(In billions of dollars)



Source: Congressional Budget Office using data from the Bureau of the Census for the actual trade balance and projections from CBO's model for other trade balances.

Note: The dashed vertical line marks the beginning of the North American Free Trade Agreement on January 1, 1994.

- a. This alternative scenario assumes no peso crash and associated Mexican recession in 1994 and 1995, no prolonged U.S. economic expansion in the 1990s, and no U.S. or Mexican recession in late 2000 and 2001.
- b. The actual-values scenario assumes the values of U.S. gross domestic product, the Mexican industrial production index, and real exchange rates that actually occurred.

(at least to the same order of magnitude). However, because the Mexican economy is much smaller than the U.S. economy (Mexican GDP ranged from one-16th to one-21st the size of U.S. GDP between 1996 and 2001), that increase represents much larger percentage growth for the Mexican economy than for the U.S. economy.

## 1

## Introduction

**W**hen the North American Free Trade Agreement (NAFTA) was under consideration for approval by the U.S. Congress, it engendered considerable debate and concern. It was the first major free-trade accord between advanced industrialized countries and a large developing country, and predictions of its effects ranged from substantial benefits for the United States to a “giant sucking sound” of jobs being moved south of the Rio Grande by firms attracted by low-wage Mexican labor. The vast majority of trade economists predicted a small positive effect on U.S. gross domestic product (GDP) and little effect on employment.<sup>1</sup>

NAFTA went into force on January 1, 1994, and it has now been in operation long enough to determine which of those predictions was most accurate. An assessment of NAFTA is relevant to current debates about trade policy because a number of proposals for similar agreements with other developing countries are on the policy agenda. Since NAFTA became effective, agreements have been proposed—and, in many cases, negotiations have been started or even completed—for a Free Trade Area of the Americas and for free-trade areas with Chile, Central America (El Salvador, Guatemala, Honduras, Nicaragua, and Costa Rica), Southern Africa (Botswana, Lesotho, Namibia, South Africa, and Swaziland), Morocco, Singapore, and various other countries of the Association of Southeast Asian Nations (likely candidates include the Philippines, Thailand, Indonesia, and Malaysia).

1. See Congressional Budget Office, *Estimating the Effects of NAFTA: An Assessment of the Economic Models and Other Empirical Studies* (June 1993), for a detailed survey and assessment of 19 modeling and other empirical studies of the likely effects of NAFTA.

### What Is NAFTA?

NAFTA is an agreement by the United States, Canada, and Mexico to phase out almost all restrictions on international trade and investment among the three countries over 15 years—with all but a few of the most sensitive restrictions being eliminated within the first 10 years.<sup>2</sup> NAFTA was preceded five years earlier by the Canada-United States Free Trade Agreement, which meant that the United States and Canada were already well on the way to eliminating the barriers to trade and investment between them when NAFTA went into effect. Therefore, the main new feature of NAFTA was the removal of most of the barriers between Mexico and those two countries. In addition, Mexico was a more important trading partner for the United States than for Canada (the buyer of 9.0 percent of U.S. exports in 1993 versus 0.4 percent of Canadian exports, and the source of 6.8 percent of U.S. imports versus 2.0 percent of Canadian imports). For those reasons—plus the much larger size of U.S.-Mexican trade than Canadian-Mexican trade in dollar terms and the greater interest of U.S.-Mexican trade to a U.S. audience—this paper concentrates on the effects of NAFTA on U.S.-Mexican trade and largely ignores the effects on U.S.-Canadian and Canadian-Mexican trade.

For Mexico, NAFTA was a late part of a much larger program of economic liberalization that extended back to the mid-1980s. In 1982, after Mexico had increased tariffs and established other restrictions and controls in response to a balance-of-payments crisis, its average tariff

2. There were also side agreements to NAFTA concerning labor and environmental issues. This paper does not examine the effects of those agreements.

rate stood at 27 percent, and the country required importers to obtain permits for all imports. Mexico then began a series of major economic reforms. It became a member of the General Agreement on Tariffs and Trade (GATT) in 1986. It reduced the portion of imports requiring licences to 36 percent in 1985, 27 percent in 1986, and 22 percent by the end of 1988. It lowered the maximum tariff rate from 100 percent in 1982 to 20 percent in 1988 and reduced the average tariff rate to 25 percent in 1985, 19 percent in 1987, and 10 percent in 1988.<sup>3</sup> According to one source, the average rate subsequently edged up to 12 percent by 1993 (another source indicates that it remained at 10 percent).

In addition to trade liberalization, the administration of President Carlos Salinas, who held office from 1988 through 1994, implemented substantial domestic economic reforms.<sup>4</sup> It privatized and deregulated a number of state enterprises, including banks, and it brought inflation down from a peak of 187.8 percent in 1987 to 6.4 percent in 1994.<sup>5</sup> It also liberalized restrictions on foreign investment in Mexico.

By comparison with that program of economic liberalization, NAFTA was somewhat small in significance. Looking just at import tariffs, one may note that the cumulative net decline in the average tariff rate from 1982 to 1993 was larger than the average rate remaining to be eliminated by NAFTA. Indeed, when NAFTA was being debated in the U.S. Congress, a number of analysts argued that the primary value of the agreement lay not in its removal of

3. The information on import licensing requirements, maximum tariff rates, and GATT membership is from J.F. Hornbeck, *NAFTA, Mexican Trade Policy, and U.S.-Mexico Trade: A Longer-Term Perspective*, CRS Report for Congress 97-811 E (Congressional Research Service, September 2, 1997), pp. 10-11.
4. See Manuel Pastor Jr., "Pesos, Policies, and Predictions: Why the Crisis, Why the Surprise, and Why the Recovery?" in Carol Wise, ed., *The Post-NAFTA Political Economy: Mexico and the Western Hemisphere* (University Park, Penn.: Pennsylvania State University Press, 1998), p. 123.
5. Those inflation rates are the percentage increases in wholesale prices from the first quarter of 1987 to the first quarter of 1988 and from the second quarter of 1993 to the second quarter of 1994, respectively.

most of the remaining restrictions on trade and investment flows but in the fact that it would make much of the previous Mexican liberalization more difficult for future governments to reverse.

NAFTA has now been in effect for over eight years, and most trade and investment barriers have been eliminated. In 1993, just before the agreement went into effect, 51.2 percent of imports from Mexico (by value) entered the United States duty free, and the average tariff on the remaining imports was 4.24 percent, for an overall average tariff rate of 2.07 percent (see Figure 1). By 2001, the percentage of imports from Mexico entering duty free had risen to 86.8 percent, and the average duty on the remainder had declined to 1.37 percent, for an overall average tariff rate of just 0.18 percent. On the Mexican side, the average tariff rate, which was roughly 12 percent in 1993, had declined to only 1.3 percent by 2001.<sup>6</sup> Enough time has elapsed and enough of NAFTA's provisions have been phased in to allow a reasonably confident assessment of the effects of the agreement on the United States.

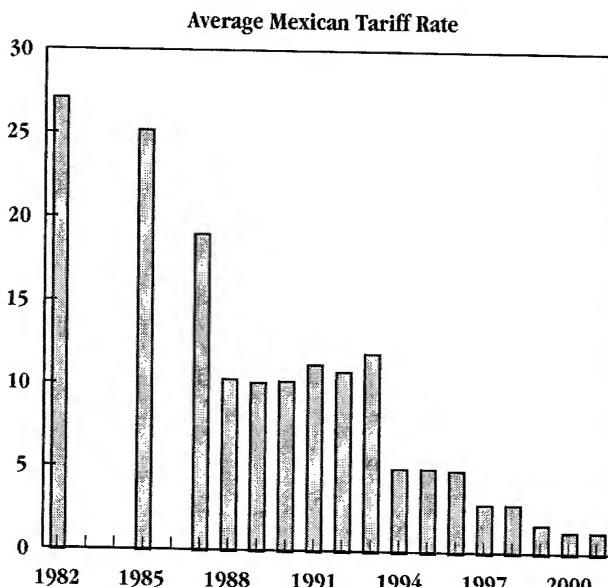
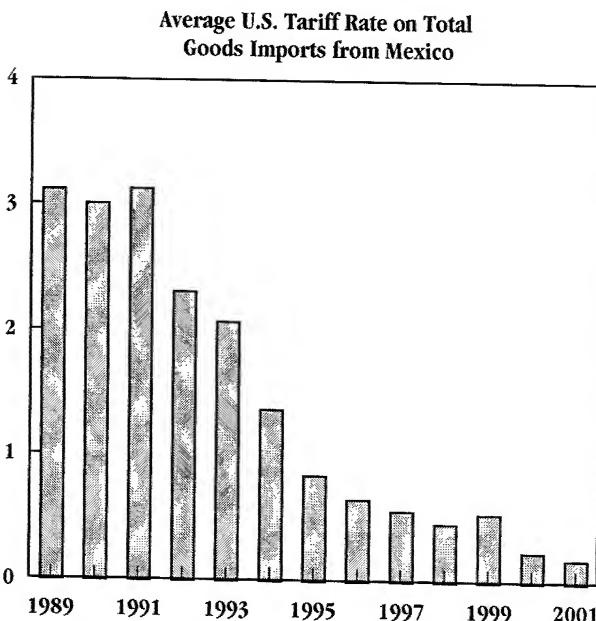
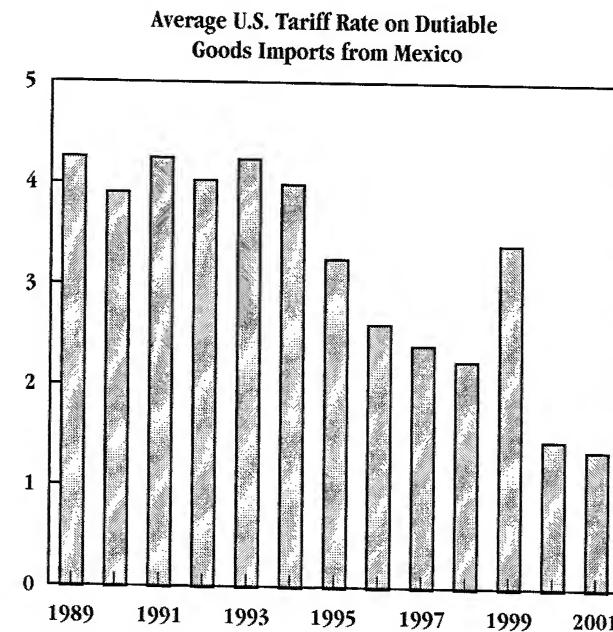
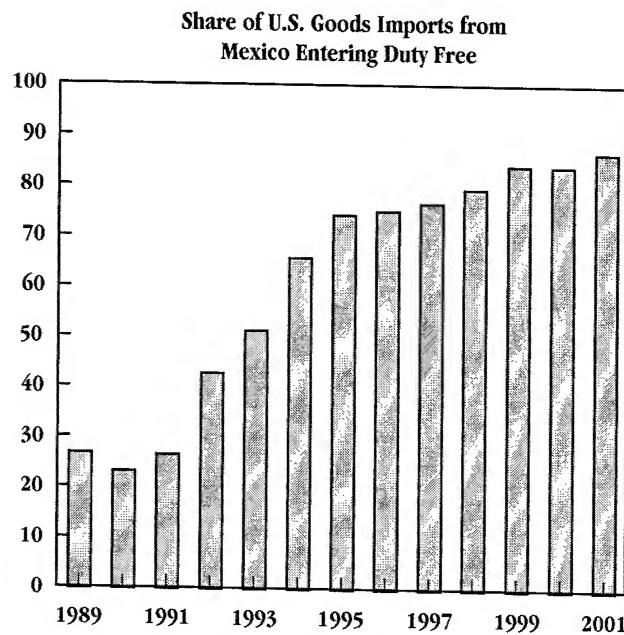
## How Should the Success or Failure of a Free-Trade Agreement Be Measured?

The economic goal of trade agreements is to increase gross domestic product (GDP). Increases in both exports and imports are generally necessary to achieve that goal and can (with qualification) be used as rough indicators of the

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6. Some sources put the average rate for 1993 at 10 percent. The rate of 12 percent used here is from Raúl Hinojosa-Ojeda and others, *The U.S. Employment Impacts of North American Integration After NAFTA: A Partial Equilibrium Approach* (Los Angeles: North American Integration and Development Center, School of Public Policy and Social Research, University of California at Los Angeles, January 2000), Figure 4.5. The average rate for 2001 is from Office of the U.S. Trade Representative, *2001 Trade Policy Agenda and 2000 Annual Report of the President of the United States on the Trade Agreements Program* (March 2001), p. 115. Various issues of the *Annual Report* are among the sources placing the rate for 1993 at 10 percent. The 12 percent rate is used here for consistency with Figure 1, which uses rates from Hinojosa-Ojeda and others for 1982 through 1995 and rates from various issues of the *Annual Report* for 1996 through 2001. Other than the rate for 1993, the *Annual Reports* do not have rates for years before 1996, and Hinojosa-Ojeda and others does not have rates for years after 1996.

**Figure 1.****Tariff Rates on U.S.-Mexican Trade Before and After NAFTA**

(In percent)



Source: Congressional Budget Office using data on U.S. imports and tariff revenues from the Bureau of the Census and data on Mexican tariffs from Office of the U.S. Trade Representative, *Trade Policy Agenda and Annual Report of the President of the United States on the Trade Agreements Program* (various years), for 1994 through 2001, and Raúl Hinojosa-Ojeda and others, *The U.S. Employment Impacts of North American Integration After NAFTA: A Partial Equilibrium Approach* (Los Angeles: North American Integration and Development Center, School of Public Policy and Social Research, University of California at Los Angeles, January 2000), for 1982 through 1993.

Note: Average U.S. tariff rates were calculated as the ratio of "calculated duties" to the customs value of imports for consumption.

**Box 1.****NAFTA and Foreign Investment**

The North American Free Trade Agreement and the Mexican economic liberalization that preceded it have affected the United States through international investment as well as through international trade. They eliminated a number of laws and regulations that directly restricted foreign ownership and investment in Mexico. In addition, by removing tariffs, import quotas, and other trade restrictions and generally deregulating business operations, they made investment in Mexico more profitable. As a result, international investment in Mexico has grown.

That growth has affected the United States in three ways. First, much of the new investment came from the United States. It went to Mexico because of higher rates of return, so the U.S. owners of the capital in question benefited. Second, some of the investment from the United States (and even some from other countries) probably would otherwise have been invested in the United States. The fact that it went to Mexico instead has reduced the aggregate capital stock in the United States and thereby raised U.S. interest rates and rates of return and reduced U.S. gross domestic product. This second effect is almost certainly so small as to be unnoticeable, however, because the investment flows from the United States were small compared with the size of the U.S. capital market and because any rise in U.S. interest rates resulting from an outflow to Mexico would attract an inflow from other countries to replace much

of the outflow. Third, a significant part of the investment undoubtedly went to construct assembly plants in Mexico for products destined for the U.S. market. That part led to increased U.S. exports to Mexico of intermediate goods for those plants and increased U.S. imports from Mexico of their finished products.

To assess with any precision the effects of NAFTA on the United States through the first two of those effects of investment flows would require determining what proportion of the increased flows resulted from NAFTA rather than from the preceding Mexican trade and other economic liberalization. It would also require constructing some sort of model (or models) of the U.S. capital market and the effects of capital flows on the U.S. economy. The first of those tasks would be extremely difficult, if not impossible, and the second would be a substantial undertaking at the very least. This paper has not attempted those tasks but instead concentrates on the more manageable task of assessing the effects that NAFTA has had on the United States through international trade flows. In so doing, it implicitly captures the third effect of NAFTA through international investment flows—the stimulation of U.S. trade with Mexico. The analysis also looks briefly at the magnitude and direction of international investment flows to and from Mexico over time in connection with the peso crash and associated Mexican recession in late 1994 and 1995, which had a substantial impact on trade.

extent to which it has in fact been achieved. Effects on the balance of trade with other parties to an agreement are not a good indicator of benefit or harm. Trade agreements can affect GDP and other aspects of the economy through foreign investment flows as well as through trade flows (*see Box 1 for more details*). However, this paper concentrates primarily on NAFTA's effects on trade flows.

**Changes in Exports and Imports**

The most-direct economic benefits from international trade arise from the fact that countries are not all equally adept at producing the same products. The reasons they

are not lie in differences in natural resources, in education levels of their workforces, in relative amounts and qualities of physical capital, in confidential technical knowledge, and so on. Without trade, each country must make everything it needs, including things it is not very efficient at producing. When trade is allowed, each country can concentrate its efforts on what it does best relative to other countries and export some of the output in exchange for imports of products it is less good at producing. As countries do that, total world output increases. World output may also grow because of increasing use of economies of scale, as a factory in one country can serve a market the

**Box 2.**

## The Effects of Trade Creation and Trade Diversion

The distinction between trade creation and trade diversion is important because the former is more likely to produce a net economic benefit in the aggregate than the latter is. Although some sectors may be hurt by trade creation, it is almost always economically beneficial overall because it occurs only when the price of the import in question is lower than the domestic cost of producing the same good. It therefore allows the domestic economy to obtain the good at lower cost than would be possible without trade.

Trade diversion is less likely to be beneficial in the aggregate (although some sectors are still likely to be helped by it) because it results in the import's being obtained at a higher cost to the economy. Using NAFTA as an illustration, the fact that the import came from elsewhere before NAFTA went into effect, when tariffs on imports from Mexico were equal to those on im-

ports from other countries, indicates that the competing country was selling the product for a lower price than Mexico was. After NAFTA, the competing country's price would still be lower, but the domestic purchaser would choose the Mexican product because (in the case of trade diversion) the Mexican price would be lower than the competing country's price plus the tariff. Although the cost to the domestic purchaser of the competing-country import would be the price plus the tariff, the cost to the economy would be the price only. The tariff would be paid by the purchaser to the U.S. government and therefore would not be a loss to the economy.

Some exceptional cases exist in which trade creation can be harmful or trade diversion beneficial, but for the reasons described above, the reverse is much more often true.

size of two or more countries rather than one. In either case, market forces ensure that all countries involved in the trade share in the benefits from the increased output.

It is the growth in both exports *and imports* of each country that allows the shift in production that increases world output. No country would export if it could not import. Exports constitute the giving away of valuable economic commodities in exchange for pieces of paper (or additions to bank accounts) that would be worthless if they could not be used to purchase imports. In the case of NAFTA, U.S. exports to Mexico are sold for pesos, which have value only insofar as they can be used to purchase imports (now or in the future) from Mexico.

Although increases in exports and imports are necessary for, and usually indicative of, benefits from a free-trade agreement, they are not a perfect measure because they are not always beneficial. Growth in exports is beneficial in almost all circumstances, but whether growth in imports is beneficial depends in part on whether the imports displace domestic production or imports from other countries not party to the agreement. The displacement of do-

mestic production is referred to by economists as *trade creation* because it results in a net increase in trade. The displacement of imports from other countries is referred to as *trade diversion* because it does not increase trade overall but rather amounts to a diversion of existing trade. Perhaps counterintuitively, trade creation almost always produces a net economic benefit (although it can create temporary painful dislocations to some domestic workers and firms), whereas the net effect of trade diversion is likely to be detrimental. (For more details, see Box 2.) Consequently, the amount and significance of trade diversion must be considered before one can make confident inferences about the benefits of a free-trade agreement from the increases in trade that result from it. Of course, if the changes in trade are small, one can conclude confidently that the net benefit or harm is small regardless of the extent of trade diversion.

### Changes in the Trade Balance

Some people gauge the success of a trade agreement by its effects on the trade balance—the difference between the value of exports and the value of imports—with the other party (or parties) to the agreement. However, such

effects are not a good indicator of the benefit or harm of an agreement for two reasons.

First, to the extent that trade balances merit any concern, it is a country's balance with the world as a whole—not its balance with any one country—that matters, and the effects of a trade agreement on the latter do not translate into effects on the former (see *Box 3*). By a fundamental accounting identity, a country's trade balance with the world as a whole (specifically, its current-account balance) is equal to the difference between aggregate saving and gross domestic investment. Neither aggregate saving nor gross domestic investment in a country as large as the United States is significantly affected by the elimination of barriers to trade with another country the size of Mexico. Therefore, a trade agreement such as NAFTA cannot significantly affect the U.S. trade balance with the world.

Second, even if the balance with the world were significantly affected by a trade agreement, one still could not validly conclude much about the benefit or harm of the agreement because the value of that balance is normally of little significance. Trade deficits with the world are not generally harmful, and trade surpluses are not generally beneficial. CBO has examined the U.S. trade deficit with the world in more detail in a previous publication.<sup>7</sup> Here it is sufficient to note a few conclusions of that analysis. Although in some extreme cases not currently applicable to the United States a country can be harmed by deficits with the world as a whole, in general such deficits are not harmful. They normally have a small positive effect on GDP because of the inflow of foreign investment that must accompany them (by the aforementioned accounting identity), which increases the aggregate capital stock. Their effect on gross national product (GNP, which is GDP minus the net interest, dividends, and other returns on capital that must be paid to the owners of the foreign investment) is even smaller and may be either positive or negative depending on the circumstances. Even if GNP declines with a given trade deficit, that does not necessarily mean that the country's citizens are worse off. Effectively what is happening in that case is that people are choosing

current consumption over future consumption, and no objective criterion exists by which to judge them right or wrong in that choice.

Trade deficits also have little if any effect on aggregate employment, and the same is true of trade agreements such as NAFTA. In the short term, jobs lost in industries producing tradable goods are offset to a greater or lesser extent by jobs gained in construction and investment-goods industries because of the inflow of foreign investment that must accompany the trade deficit. Whatever the net effect, wages adjust over time until demand for labor again equals supply so that there is no effect on the aggregate level of employment in the long run (although some redistribution of employment among industries may occur).

Notwithstanding the foregoing analysis, many people suspect that NAFTA caused or significantly worsened the substantial decline in the U.S. trade balance with Mexico that has occurred since the agreement went into effect, and that suspicion has led to criticism of NAFTA and cast a negative light on proposals for future trade talks and agreements. Accordingly, it is worth examining NAFTA's effects on the trade balance along with its effects on exports, imports, and GDP to determine whether that suspicion is correct. (The agreement's effects on trade in various individual products can also be of interest for some purposes but are beyond the scope of this analysis.)

## How Has U.S.-Mexican Trade Changed Over Time?

As one would expect from NAFTA and the Mexican program of economic reform and trade liberalization that preceded it, U.S. trade with Mexico has grown substantially over the past two decades—in absolute dollar terms, as a percentage of U.S. GDP, and relative to U.S. trade with other countries. The growth began long before NAFTA and has continued in the years since the agreement. Mexico is now the United States' second largest export market and second largest supplier of imports.

Almost two years before NAFTA, the U.S. trade balance with Mexico peaked at a small surplus and began to decline. A year after NAFTA, it suddenly plunged into

7. Congressional Budget Office, *Causes and Consequences of the Trade Deficit: An Overview* (March 2000).

**Box 3.**

## Trade Balances with Individual Countries Versus the Balance with the Entire World

To the extent that any reason for concern about trade balances exists, that concern relates to the balance with the world as a whole, not the balance with any particular country. The experience of an individual person provides a useful analogy. The typical person buys large quantities of goods over time from the local supermarket but rarely if ever sells goods to the supermarket, which means that he (or she) runs a deficit with the supermarket. Similarly, he runs deficits with department stores, his doctors, and any other providers of goods and services that he purchases. He sells his own labor or services to his employer but rarely if ever buys anything in return (aside from payroll deductions for benefits) and therefore runs a surplus with his employer.

No one would suggest that a person should not run those individual deficits. The economic harm that would ensue from such a constraint is evident. Further, the size of any of the individual deficits is of no importance. What matters is the overall trade balance—the surplus with the employer minus the sum of all of the individual deficits. If that overall balance is in deficit, then the person must borrow or draw down his savings. If he does neither, then any increase in one of the individual deficits must be offset by a reduction in one or more of the others or by an increase in the surplus with his employer. If a new store opens nearby, creating a new opportunity for trade, the person may incur a new deficit with that store. If he has any sense, however, he will not make his decisions about his overall budget balance contingent on the opening of a new store. Rather, he will offset the deficit with the new store by reducing his deficits with other stores.

Similarly, in the absence of barriers to international trade, the United States (or any other country) will run deficits with some countries and surpluses with others. It will do that for the same reason that people run deficits

with some entities and surpluses with others in their daily lives: because different countries produce different products and have different products that they need to purchase. If the United States needs more of the particular products that a country produces than that country needs of the particular products that the United States produces, the United States will run a trade deficit with that country. If the opposite is true, it will run a trade surplus. To insist that trade with each individual country be in balance makes no more sense than to insist that people not run individual deficits and surpluses with their favorite stores or their employers.

For the same reason, the size of the trade deficit with any one country is unimportant; what matters is the overall trade balance with the world. By a fundamental accounting identity, that overall trade balance (actually a specific measure of the trade balance called the current-account balance) must equal the difference between aggregate saving and gross domestic investment. Hence, just as an individual running an overall deficit must be “dissaving,” a country running a current-account deficit must be saving less than is required to finance the capital investment occurring within the country, so part of that investment must be financed by inflows of capital from abroad.

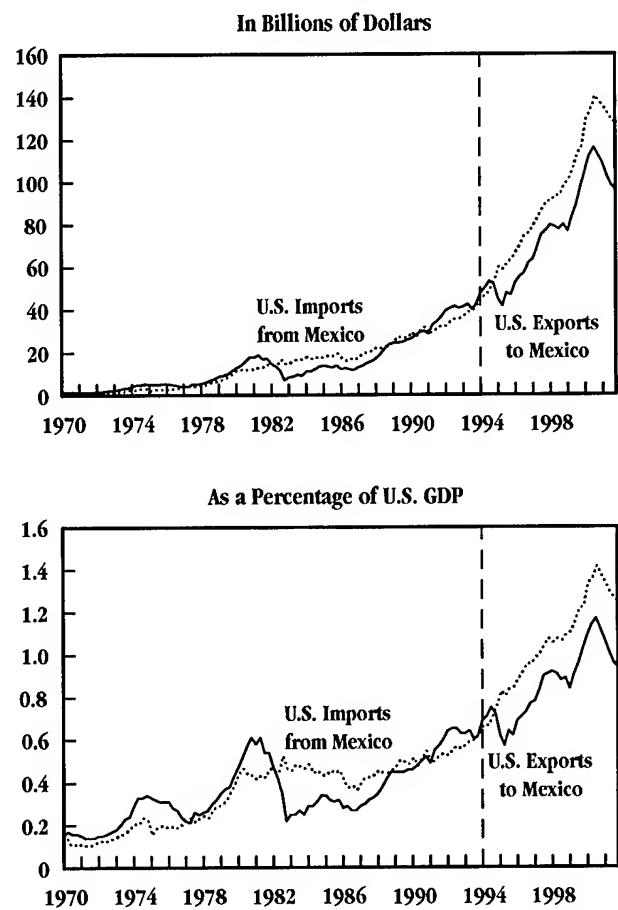
Just as a person will not allow the opening of a new store to put his budget out of balance so that he dissaves, the aggregate saving and gross domestic investment of a country are not significantly affected when barriers to trade with other individual countries are eliminated, creating new opportunities for trade. Therefore, if NAFTA were to cause the United States to incur a trade deficit with Mexico, there would be offsetting increases in U.S. trade balances with other countries. The result would be little—if any—net effect on the U.S. trade deficit with the world.

a large deficit. After recovering only partially over the next few years, the balance began falling again—this time to record deficits. The decline continued through the end of 2001.

### Changes in Exports and Imports

U.S. goods trade with Mexico—both exports and imports—has increased significantly over the past two decades (see *Figure 2*). Over the 11-year period from the end of 1982 (just after a Mexican balance-of-payments crisis) to the end of 1993 (just before NAFTA), the dollar value of quarterly U.S. goods exports to Mexico rose by nearly

**Figure 2.**  
**U.S. Goods Trade with Mexico**



Source: Congressional Budget Office using data on trade from the Bureau of the Census and data on gross domestic product from the Bureau of Economic Analysis.

Note: The dashed vertical lines mark the beginning of the North American Free Trade Agreement on January 1, 1994.

a factor of six. It almost tripled again by the third quarter of 2000 before slipping back during the recent recession in the United States and Mexico. Imports of goods followed a similar pattern, almost tripling over the same pre-NAFTA period and then more than tripling again before falling back in the recession.

Expressed as a percentage of GDP—which eliminates the illusory effects of inflation and of increases that merely reflect economic growth—exports nearly tripled over the 11 years leading up to NAFTA and almost doubled again by the third quarter of 2000, at which point they declined during the recession (see *Figure 2*). Imports increased by one-third over the 11 years preceding NAFTA and then more than doubled before falling back in the recession.

The rise in U.S. trade with Mexico was not smooth. One year after NAFTA went into effect, exports to Mexico declined substantially before resuming their climb. At the same time, the growth of imports from Mexico accelerated slightly (at least relative to the growth of imports from the world as a whole) and then returned to near its original rate.

U.S. trade with Mexico has grown faster than U.S. trade with the world as a whole. Of quarterly U.S. goods exports to the world, the share destined for Mexico rose from 3.7 percent at the end of 1982 to 8.8 percent in the last quarter before NAFTA and then to 14.2 percent at the end of 2001 (see *Figure 3*). Likewise, the share of quarterly U.S. goods imports coming from Mexico grew from 4.6 percent at the end of 1986 (the end of a decline resulting from a crash in crude oil prices) to 7.1 percent just before NAFTA and then to 11.8 percent by the end of 2001.

Cumulatively, over the 15 years ending with 2001, Mexico's share of U.S. quarterly goods exports rose by a substantial 9.1 percentage points while its share of U.S. goods imports rose by a smaller but still substantial 7.3 percentage points. Of those increases, 5.4 percentage points and 4.7 percentage points, respectively, occurred over the eight years since NAFTA went into effect.

The increase in Mexico's share of U.S. goods trade caused Mexico to rise in the rankings of the United States' main

trading partners. Before NAFTA, Mexico was the third largest market for U.S. exports and gaining rapidly on first- and second-place Canada and Japan. Mexico passed Japan to become the second largest market in 1997. The situation with goods imports was similar, but Mexico started out farther behind and therefore took longer to catch up. In 1989, it was the third largest supplier of U.S. imports, behind first-place Japan and second-place Canada. In 1992, a year before NAFTA, Canada and Japan switched positions but Mexico remained in third place. Mexico finally passed Japan in 2001 to rank second as a source of U.S. imports.

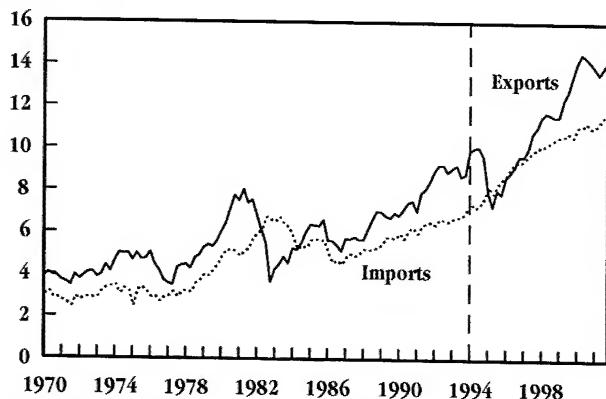
### Changes in the Trade Balance

Even though the share of U.S. goods exports destined for Mexico has increased more than has the share of U.S. goods imports coming from Mexico, the balance of goods trade with Mexico has fallen substantially since NAFTA went into effect (see *Figure 4*). It actually peaked almost two years before NAFTA but did not decline much until a year after the agreement, when it dropped suddenly from a deficit of \$2.5 billion (0.03 percent of U.S. GDP) in the fourth quarter of 1994 to \$17.5 billion (0.24 percent of GDP) in the second quarter of 1995—an all-time record in dollar terms and close to a record as a percentage

**Figure 3.**

### Mexico's Share of U.S. Goods Trade with the World

(In percent)



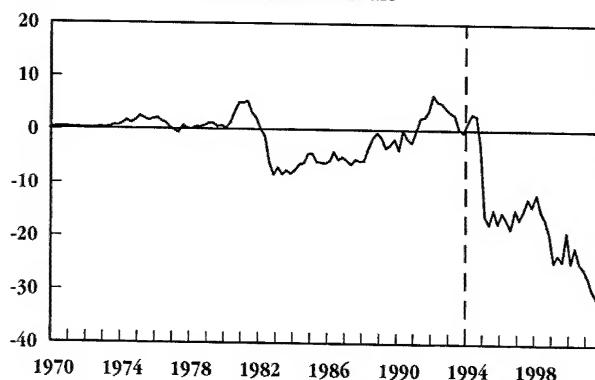
Source: Congressional Budget Office using data from the Bureau of the Census.

Note: The dashed vertical line marks the beginning of the North American Free Trade Agreement on January 1, 1994.

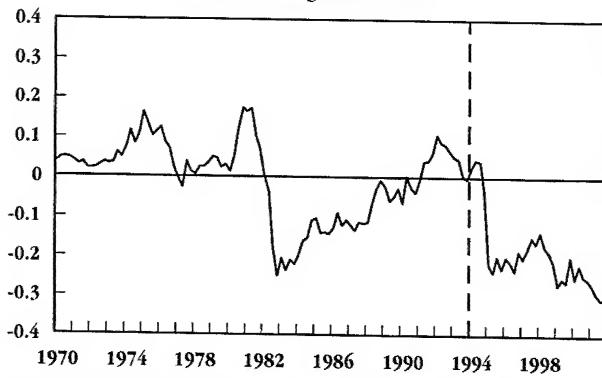
**Figure 4.**

### U.S. Goods Trade Balance with Mexico

In Billions of Dollars



As a Percentage of U.S. GDP



Source: Congressional Budget Office using data on trade from the Bureau of the Census and data on gross domestic product from the Bureau of Economic Analysis.

Note: The dashed vertical lines mark the beginning of the North American Free Trade Agreement on January 1, 1994.

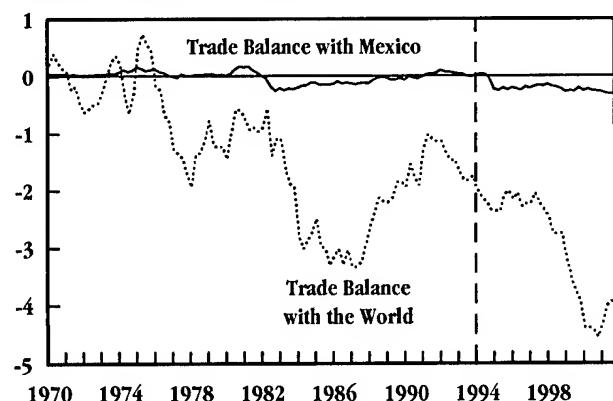
of GDP.<sup>8</sup> The balance recovered slightly through the last quarter of 1998 and then resumed its descent, soon reaching record deficits even as a percentage of GDP. By the end of 2001, the U.S. goods trade deficit with Mexico stood at \$31.5 billion (0.30 percent of GDP).

The United States' goods trade with the world as a whole also exhibited a growing deficit over that period. The balance of that trade has been in deficit and fluctuating about a declining trend since the first quarter of 1976. In the last quarter before NAFTA, the deficit was \$117.8 billion (1.73 percent of GDP), and it reached \$454.5 billion

8. The dollar figures given here are seasonally adjusted annual rates.

**Figure 5.****U.S. Goods Trade Balance with Mexico and with the World**

(As a percentage of U.S. GDP)



Source: Congressional Budget Office using data on trade from the Bureau of the Census and data on gross domestic product from the Bureau of Economic Analysis.

Note: The dashed vertical line marks the beginning of the North American Free Trade Agreement on January 1, 1994.

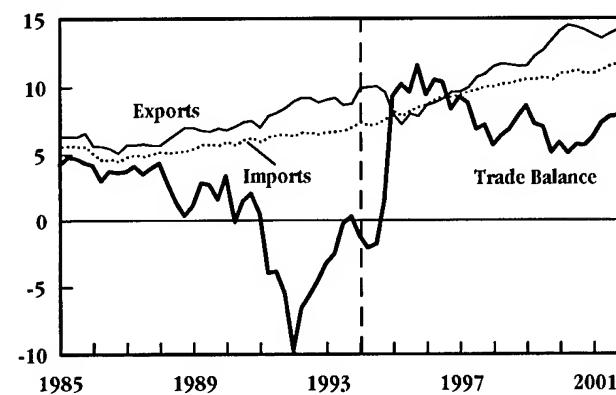
(4.53 percent of GDP) by the end of 2000 before subsiding slightly in the recession (see Figure 5). Cumulatively, the goods trade balance with Mexico underwent a post-NAFTA decline of \$31.2 billion through the last quarter of 2001, while the fall in the balance with the world over the same period was \$284.3 billion.

The U.S. trade deficit with Mexico is smaller than might be expected given Mexico's significance in U.S. trade. The

country's share in the U.S. goods trade deficit with the world has been smaller than its shares in U.S. exports and imports for almost all of the past 17 years, the only exception being the comparatively short period from the beginning of 1995 through the third quarter of 1996 (see Figure 6). Correspondingly, Mexico's ranking on the list of trading partners with which the United States has the largest deficits has been lower than its rankings on the lists of top export markets and import suppliers.

**Figure 6.****U.S. Goods Trade with Mexico as a Share of U.S. Goods Trade with the World**

(In percent)



Source: Congressional Budget Office using data from the Bureau of the Census.

Note: The dashed vertical line marks the beginning of the North American Free Trade Agreement on January 1, 1994.

## 2

## Other Influences on U.S.-Mexican Trade Besides NAFTA

**T**

he onset of the substantial decline in the U.S. balance of trade with Mexico not long after the North American Free Trade Agreement went into effect has led some people to conclude that the latter caused the former. However, numerous other factors besides NAFTA have influenced U.S.-Mexican trade over time and could explain some or even most of the changes described in Chapter 1. Those factors include the U.S. and Mexican business cycles, saving and investment behavior in the United States, fluctuations in crude oil imports and prices, Mexico's status as a developing country, its trade and other economic policies, and fluctuations in the dollar/peso exchange rate. Of particular importance since NAFTA began are a sudden major decline in the value of the peso at the end of 1994, a severe Mexican recession in 1995, the U.S. economic expansion that lasted throughout most of the 1990s, and recessions in the United States and Mexico in late 2000 and 2001. Those factors are largely independent of NAFTA, and their effects must be removed from the observed fluctuations in trade before valid conclusions can be drawn about the effects of the agreement.

### Domestic U.S. Factors

As discussed in Chapter 1, the U.S. goods trade balance with the world has been negative and fluctuating about a declining trend for more than 25 years. The current-account balance with the world, a broader measure of the balance of trade, has been negative in all except three quarters (two quarters for seasonally adjusted data) since the third quarter of 1982 and similarly fluctuating about a declining trend.

The major factors influencing those balances are domestic. They include a long decline in saving as a share of gross domestic product that began in the mid-1950s and accelerated in the 1980s, fluctuations in the business cycle, and relatively attractive investment opportunities in the United States in the 1990s.<sup>1</sup> Imports and trade deficits tend to increase during economic expansions and decrease (or grow more slowly) during recessions. Because of an accounting identity that equates the current-account balance with the difference between gross saving and gross domestic investment, declines in saving and increases in investment cause the trade balance to decline. Personal saving (a component of gross saving) began falling as a percentage of GDP in the early 1980s and continued to do so through 2000, with only a small deviation from the downward trend in the late 1980s and early 1990s. Real gross private domestic investment trended upward slowly starting in the 1950s by one measure and was especially strong in the 1990s.

Those factors have influenced the component of the balances with the world represented by the goods trade balance with Mexico. Like the two balances with the world, the balance with Mexico has fluctuated about a downward trend for two decades. Also like the two balances with the world, it declined in the early 1980s with the onset of a U.S. economic expansion (although more abruptly and briefly), rose back to a peak with the recession of the early 1990s, and fell substantially over the rest of the decade

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1. For more details, see Congressional Budget Office, *Causes and Consequences of the Trade Deficit: An Overview* (March 2000).

as a result of the prolonged U.S. economic expansion of the period (see *Figure 4 in Chapter 1*). In 2001, the balance with Mexico and the balances with the world parted ways, with the U.S. recession causing the deficit with the world to decline while the deficit with Mexico continued to increase. The timing of those factors is not correct for explaining the sudden large drop in exports and in the trade balance that occurred in the first quarter of 1995, but the factors could have contributed substantially to the continuing decline in the balance in subsequent years.

## Mexican Economic Development

Mexico has grown rapidly since it began liberalizing its economy the mid-1980s. That growth has required high levels of investment, which have not been completely matched by increased saving. (The difference has been made up by a net increase in inflows of foreign investment.) As a result, Mexico's saving/investment balance has been lower than it would otherwise have been, and in accordance with the aforementioned accounting identity, its balance of trade with the world has been lower (meaning that other countries have had higher balances with Mexico).<sup>2</sup> That fact might explain, at least in part, why Mexico's share of the U.S. goods trade deficit with the world has fairly consistently been smaller than would be expected from its share of U.S. trade for the past 17 years.

## Imports of Crude Oil from Mexico

Fluctuations in the value of crude oil imports once dominated movements in U.S. imports from Mexico, but they

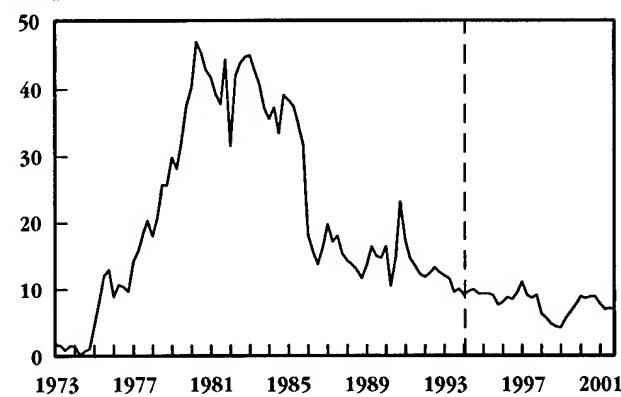
2. That course of events is consistent with a standard model of economic development in the economics literature. According to that model, when countries are in early stages of development and growing rapidly, their investment is higher than their saving and they consequently run trade deficits. Once they become fully developed, their investment declines relative to GDP and is surpassed by saving, so they begin running trade surpluses. The model accurately describes the history of the United States through the 1970s, but it does not always hold true. For the past couple of decades, the United States has run deficits for the reasons given in the section on domestic U.S. factors, and Japan in the 1960s ran surpluses despite its rapid growth rate because it had very high rates of saving. The case of Japan prompted articles in the economics literature probing why the Japanese saving rate was so high.

have not done so since NAFTA went into effect. Largely because of fluctuations in the amount of oil supplied by the Middle East, the value of U.S. crude oil imports from Mexico rose from near zero in the early 1970s to 46.9 percent of U.S. imports from Mexico in the second quarter of 1980 and then declined rather rapidly in the mid-1980s, reaching 13.7 percent of U.S. imports in the third quarter of 1986 (see *Figure 7*). Since NAFTA went into effect, however, crude oil's share of U.S. imports from Mexico has never risen much above 10 percent.

### Figure 7.

#### Crude Oil as a Share of U.S. Goods Imports from Mexico

(In percent)



Source: Congressional Budget Office using data on trade from the Bureau of the Census and the Energy Information Administration and data on crude oil prices from the Bureau of Labor Statistics.

Note: The dashed vertical line marks the beginning of the North American Free Trade Agreement on January 1, 1994.

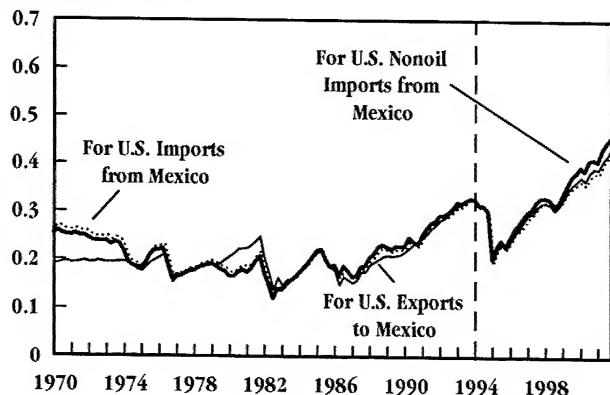
## The Exchange Rate Between the Dollar and the Peso

The dollar/peso exchange rate has varied substantially over time—with sudden large declines in the peso in 1982 and at the end of 1994 being particularly notable (see *Figure 8*).<sup>3</sup> By changing the relative prices of U.S. and Mexi-

3. The real exchange rate in *Figure 8* is expressed as dollars per peso rather than the pesos per dollar that is more common in the economics literature because the discussion in the text focuses on the value of the peso. Movements in the value of the peso are opposite in direction to movements in the exchange rate expressed in the

**Figure 8.****Real Exchange Rates for U.S. Goods Trade with Mexico**

(In dollars per peso)



Source: Congressional Budget Office using data on nominal exchange rates and Mexican prices from International Monetary Fund, *International Financial Statistics*, and data on prices and quantities of U.S. traded goods from the Bureau of the Census, Bureau of Labor Statistics, Bureau of Economic Analysis, and Energy Information Administration.

Notes: The effects of Mexican inflation over time were removed using the Mexican wholesale price index. The effects of U.S. inflation over time were removed using price indices for U.S. exports to and imports from Mexico that CBO constructed from the data sources cited above.

The dashed vertical line marks the beginning of the North American Free Trade Agreement on January 1, 1994.

can goods, such fluctuations can have large effects on trade.

Exchange rates can vary for a number of reasons. Not all of those reasons are independent of the other factors discussed in this chapter, but some of them are. In particular, rather than let the nominal value of the peso be determined by market forces, the Mexican central bank historically (until the end of 1994) intervened in currency markets to keep the peso at various target levels relative to the dollar over time. The declines in 1982 and the end of 1994 occurred when, in the face of downward market pressure on the peso, the Mexican central bank ran short

more-common pesos per dollar. Consequently, the crash of the peso at the end of 1994 would appear as an upward spike if the exchange rate were expressed that way, which might confuse some readers.

of the dollar reserves required to prop it up. On the latter occasion, the real value of the peso (the value adjusted for inflation in the United States and Mexico) dropped by one-third from the last quarter of 1994 to the first quarter of 1995—coincident with the sharp drop in U.S. exports to Mexico, the acceleration of import growth, and the sudden decline in the trade balance that took place a year after NAFTA went into effect. The fall in the value of the peso made Mexican goods less expensive relative to U.S. goods and therefore could partly explain those changes in trade.

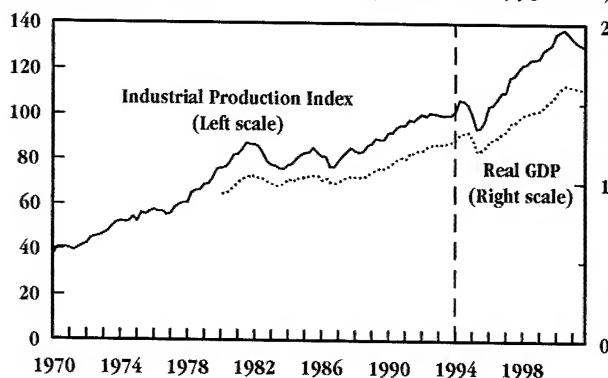
**The Mexican Business Cycle**

Mexico has experienced substantial fluctuations in aggregate economic activity over time, with severe recessions in 1982-1983 and 1995 and another recession in 2001 being especially significant (see Figure 9). Just as the U.S. trade balance with the world is negatively correlated with the U.S. business cycle, the Mexican trade balance with the world is negatively correlated with the Mexican business cycle. As a result, U.S. exports to Mexico tend to increase whenever Mexico undergoes an economic expansion, and the U.S. trade balance with Mexico rises accordingly. Similarly, U.S. exports and the trade balance tend to decline whenever Mexico goes into a recession.

**Figure 9.****Mexican Industrial Production and Real Gross Domestic Product**

(Index, 1993 = 100)

(Trillions of 1993 Pesos)



Source: International Monetary Fund, *International Financial Statistics*.

Note: The dashed vertical line marks the beginning of the North American Free Trade Agreement on January 1, 1994.

The 1995 recession was marked by a 9.7 percent drop in seasonally adjusted real GDP, which coincided precisely with the sudden substantial decline in the U.S. trade balance with Mexico that occurred a year after NAFTA went into effect. The recession in 2001 coincided with the continuing decline of the U.S. trade balance with Mexico even as the U.S. balance with the world recovered somewhat because of the U.S. recession.

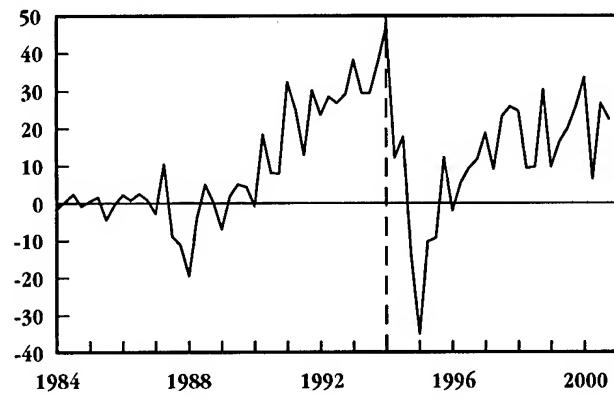
The peso crash and Mexican recession in late 1994 and 1995 were not independent events. They both resulted from a severe financial crisis in Mexico that has been discussed at length in the economics literature.<sup>4</sup> Its occurrence just a year after NAFTA went into force might lead some people to suspect that NAFTA played a role in causing those events or making them worse, but in fact it did not.

4. See, for example, the following, on which the discussion of this section is based: Manuel Pastor Jr., "Pesos, Policies, and Predictions: Why the Crisis, Why the Surprise, and Why the Recovery?" in Carol Wise, ed., *The Post-NAFTA Political Economy: Mexico and the Western Hemisphere* (University Park, Penn.: Pennsylvania State University Press, 1998), pp. 119-147; William C. Gruben, "Policy Priorities and the Mexican Exchange Rate Crisis," *Economic Review*, Federal Reserve Bank of Dallas (First Quarter 1996), pp. 19-29; Christopher J. Neely, "The Giant Sucking Sound: Did NAFTA Devour the Mexican Peso?" *Review*, Federal Reserve Bank of St. Louis (July/August 1996), pp. 33-47; "Origins and Evolution of the Current Crisis," in Organization for Economic Cooperation and Development, *OECD Economic Surveys: Mexico, 1995* (Paris: OECD, 1995), pp. 3-40; "Evolution of the Mexican Peso Crisis" and "Mexican Foreign Exchange Market Crises from the Perspective of the Speculative Attack Literature," in International Monetary Fund, *International Capital Markets: Developments, Prospects, and Policy Issues* (August 1995), pp. 53-79; Francisco Gil-Diaz and Agustin Carstens, "One Year of Solitude: Some Pilgrim Tales About Mexico's 1994-1995 Crisis," *American Economic Review: Papers and Proceedings*, vol. 86, no. 2 (May 1996), pp. 164-169; Guillermo A. Calvo and Enrique G. Mendoza, "Petty Crime and Cruel Punishment: Lessons from the Mexican Debacle," *American Economic Review: Papers and Proceedings*, vol. 86, no. 2 (May 1996), pp. 170-175; Sebastian Edwards, "Exchange-Rate Anchors, Credibility, and Inertia: A Tale of Two Crises, Chile and Mexico," *American Economic Review: Papers and Proceedings*, vol. 86, no. 2 (May 1996), pp. 176-180; and Anne O. Krueger, "NAFTA's Effects: A Preliminary Assessment," *The World Economy*, vol. 23, no. 6 (June 2000), pp. 761-775.

Over the years leading up to NAFTA, the real value of the peso relative to the dollar rose substantially. By 1994, it was at record levels, and some analysts thought the peso was overvalued. In that year, investors in Mexico were rattled by considerable political turmoil—including an armed rebellion in the state of Chiapas, a presidential election in Mexico, the assassination of the presidential candidate of the dominant Institutional Revolutionary Party (PRI), the assassination of the Secretary General of the PRI, and the resignation of the Secretary General's brother as Deputy Attorney General claiming a cover-up in the investigation of the latter assassination. The result was a substantial decline in (and even a net outflow of) foreign investment in Mexico, which had previously been high because of the investment opportunities afforded by the forthcoming trade agreement and by Mexico's general economic liberalization (see Figure 10).

**Figure 10.**  
**Net Foreign Investment in Mexico**

(In billions of dollars)



Source: International Monetary Fund, *International Financial Statistics*.

Notes: Data not seasonally adjusted.

The dashed vertical line marks the beginning of the North American Free Trade Agreement on January 1, 1994.

The investment decline was exacerbated by other factors. Rising U.S. interest rates made the United States more attractive to investors relative to Mexico. Investors may also have feared a repetition of the devaluation that had occurred at the end of the previous presidential administration, when some thought the peso was overvalued, or of the peso/dollar conversion problems that had occurred during the peso crisis in 1982. It is clear in hindsight that

the resulting crisis was made worse by various well-intended policies of the Mexican government, such as continuing its longstanding policy of maintaining a target exchange rate after international capital markets had grown to the point that swings in international investment flows could dwarf the resources of central banks for dealing with currency fluctuations; offsetting the effects on the money supply of the Banco de Mexico's intervention in the foreign exchange market in 1994 to maintain the peso's value (what economists refer to as sterilization of the intervention); and converting much of the government's debt to short-term dollar-indexed securities during that year.<sup>5</sup>

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5. In defense of the Mexican government, the targeted exchange rate policy in the years leading up to NAFTA was used as part of a very successful anti-inflation program. Further, not sterilizing its currency-market interventions in 1994 would have worsened the performance of the Mexican economy, which was felt to be subpar already as the presidential election approached; and the conversion of its debt to dollar-indexed securities reduced the interest rates it had to pay and served as a signal to investors that it did not intend to devalue the peso (since devaluation would make paying off the debt much more difficult).

The decline in investment caused interest rates in Mexico to rise and put severe downward pressure on the value of the peso. Ultimately, Mexico's central bank ran out of the foreign exchange reserves required to keep the peso from falling and was forced first to devalue the currency and then to let it float. Interest rates skyrocketed, the government and private sector were unable to borrow from abroad, and the country went into a severe recession.

NAFTA had little to do with that course of events. Consequently, the analysis in this paper removes the effects of the peso crash and Mexican recession from the observed fluctuations in U.S.-Mexican trade—along with the effects of the other factors discussed earlier—in order to isolate the effects of the agreement.



## 3

## The Effects of NAFTA

To disentangle the effects of the North American Free Trade Agreement from those of the other influential factors discussed in Chapter 2, the Congressional Budget Office constructed a model of U.S. trade with Mexico.<sup>1</sup> Results from the model indicate that:

- Changes in trade between the United States and Mexico since NAFTA went into effect have been determined primarily by factors other than the agreement.
- Without NAFTA, both U.S. exports to and imports from Mexico would have grown almost as much as they did with NAFTA, and they would have fluctuated almost identically to the manner in which they did with NAFTA.
- NAFTA has had a comparatively small, but growing, positive effect on U.S. exports to Mexico (ranging from 2.2 percent in 1994 to 11.3 percent in 2001) and a similar effect on U.S. imports from Mexico (ranging from 1.9 percent in 1994 to 7.7 percent in 2001).
- The effects of NAFTA on the U.S. balance of trade in goods with Mexico have been positive in most years, and very small in all years, since the agreement began. The decline in the balance since 1993 is completely attributable to the peso crash in late 1994, the associated Mexican recession, the prolonged U.S. economic boom from the early 1990s through 2000, and the Mexican recession in late 2000 and 2001

(with the effect of the peso crash itself—exclusive of the associated recession—being relatively minor).

CBO estimates that the increased trade resulting from NAFTA has probably increased U.S. gross domestic product, but by a very small amount—probably a few billion dollars or less, or a few hundredths of a percent.

### The Effects of NAFTA on U.S.-Mexican Trade

CBO's model calculates quarterly real U.S. goods exports to Mexico as a function of the average Mexican tariff rate, a so-called dummy variable to capture the effects of NAFTA's nontariff provisions, the real exchange rate between the dollar and the peso, and real Mexican economic activity as measured by the Mexican industrial production index.<sup>2</sup> Similarly, it calculates quarterly real U.S. goods imports from Mexico as a function of the average U.S.

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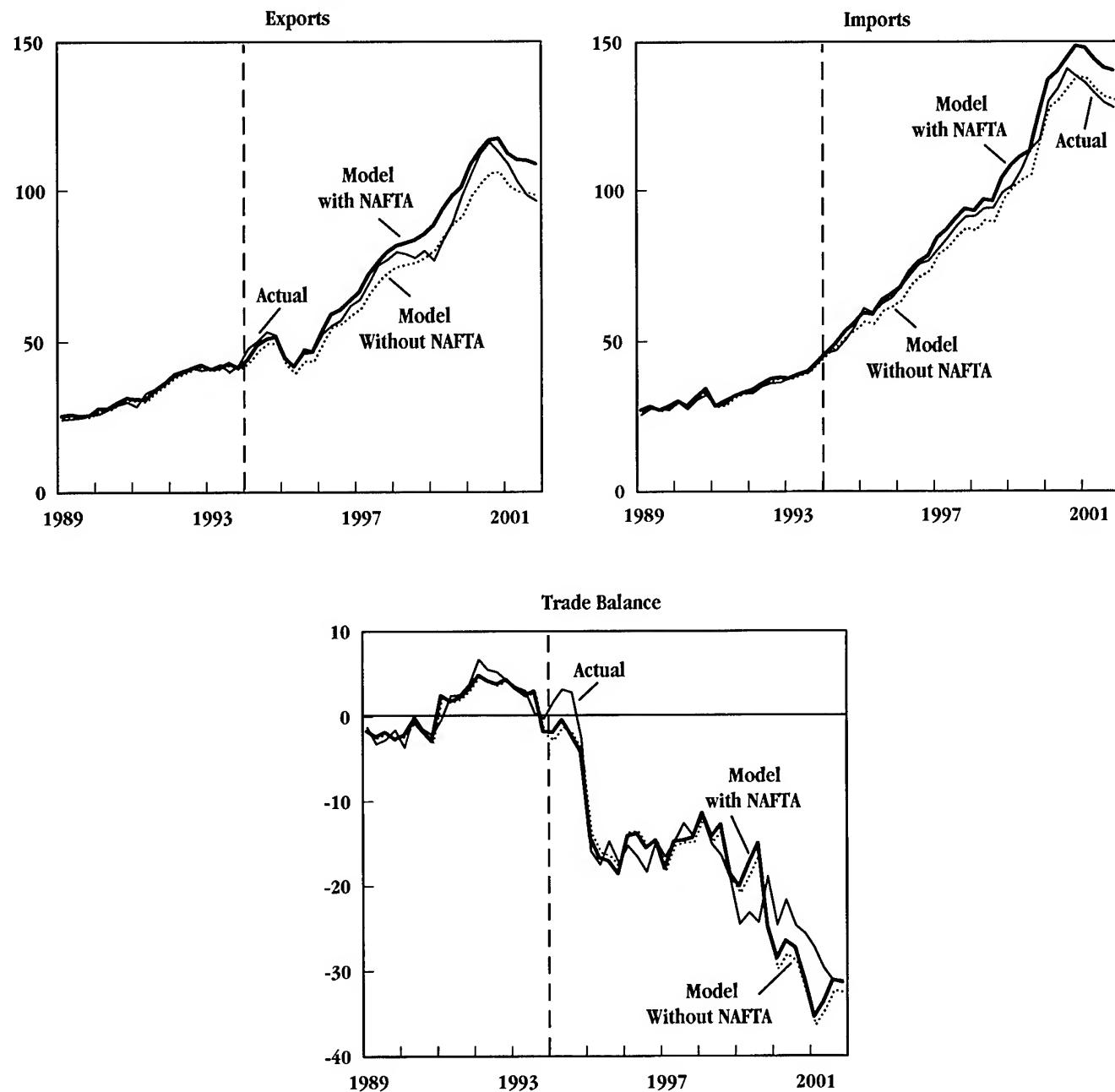
2. CBO used the Mexican industrial production index for the export equation because numbers for real Mexican GDP were not available before 1980, and such early numbers were necessary for a supporting version of the model discussed in Appendixes A and C. The availability of data aside, the industrial production index is likely to be a better variable than real GDP for use in the export equation because a large portion of U.S. exports are inputs for Mexican industry, whose level of activity and consequent need for inputs is measured by the industrial production index. The proportion of U.S. imports from Mexico that are inputs for U.S. production is smaller and the proportion destined for final consumption in the United States is correspondingly larger. Consequently, demand for imports is likely to be better correlated with a broader measure of income, such as real GDP, than with industrial production, making real GDP a better variable for use in the import equation.

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1. That model is described in detail in Appendix A.

**Figure 11.****U.S. Goods Trade with Mexico with and Without NAFTA**

(In billions of dollars)



Source: Congressional Budget Office using data from the Bureau of the Census for actual values and projections from CBO's model for other values.

Note: The dashed lines mark the beginning of the North American Free Trade Agreement on January 1, 1994.

**Table 1.****Effects of NAFTA on U.S. Goods Trade with Mexico**

	Effects in Billions of Dollars			Effects in Percent			Effects as a Percentage of U.S. GDP		
	Exports	Imports	Trade Balance	Exports	Imports	Exports	Imports	Trade Balance	
1994	1.1	0.9	0.1	2.2	1.9	0.016	0.014	0.002	
1995	2.0	2.9	-0.8	4.7	4.9	0.029	0.040	-0.012	
1996	3.8	4.2	-0.4	7.2	6.1	0.052	0.057	-0.006	
1997	5.6	5.4	0.2	8.6	6.8	0.074	0.071	0.003	
1998	6.9	6.4	0.5	9.5	7.2	0.086	0.080	0.006	
1999	8.4	7.5	0.9	10.8	7.4	0.101	0.090	0.011	
2000	10.4	9.1	1.3	10.3	7.2	0.120	0.105	0.015	
2001	10.3	9.4	0.9	11.3	7.7	0.118	0.107	0.010	

Source: Congressional Budget Office.

Note: Effects are calculated as the difference, averaged year by year, between the lines labeled "Model with NAFTA" and "Model Without NAFTA" in Figure 11. The difference between the effect listed for exports and the effect listed for imports in a given year may not precisely equal the effect listed for the trade balance because of rounding.

tariff rate, a dummy variable for the nontariff provisions of NAFTA, the real exchange rate between the dollar and the peso, and real U.S. economic activity as measured by real GDP.<sup>3</sup> Real trade values calculated by the model were subsequently converted to nominal values to produce the numbers presented in this paper. The parameters of the model were estimated using data extending from the beginning of 1989 through the end of 2001.<sup>4</sup>

According to the model, the vast bulk of the growth and fluctuation of both U.S. goods exports to Mexico and U.S. goods imports from Mexico has occurred for reasons other than NAFTA (see Figure 11). Simulations from the model indicate that 85 percent of the year-over-year increase in exports from 1993 to 2001, and 91 percent of the growth

in imports over the same period, would have happened even if NAFTA had not been implemented. All of the major fluctuations in goods exports and imports would have occurred as well.

NAFTA, according to the simulations, has had comparatively small and smoothly increasing positive effects on both exports and imports over time (see Table 1). It increased U.S. goods exports by 2.2 percent in 1994 and by gradually growing amounts thereafter, up to 11.3 percent in 2001. In dollar terms, the positive effect grew from \$1.1 billion in 1994 to \$10.4 billion by 2000 before easing back very slightly, to \$10.3 billion, in 2001. At no time did the effect on annual exports exceed 0.12 percent of U.S. GDP. Similarly, NAFTA increased U.S. goods imports from Mexico by 1.9 percent (or \$0.9 billion) in 1994 and then by gradually growing amounts, up to 7.7 percent (or \$9.4 billion) in 2001. The agreement's effect on annual imports remained below 0.11 percent of GDP throughout the period. (Because the effects on exports and imports have been relatively small, it follows that disruptions to employment have been small.)

3. Technically, the model calculates nonoil imports as a function of those variables, and CBO added data on actual oil imports back into its projections to obtain total imports. That procedure effectively assumes oil imports to be the same under all scenarios—in particular, the same with NAFTA as without it. The error introduced by that assumption should be small, and CBO judged it to be outweighed by the improved fit of the model and resulting improved accuracy of predictions. (See Appendix A for more details.)

4. The reasons for the choice of that range, and the implications of the choice for the results and conclusions, are discussed later in this chapter.

The increases in trade caused by NAFTA were far more important for Mexico than for the United States because of Mexico's much smaller economy. The estimated value of U.S. exports to Mexico attributable to NAFTA in 2001

equaled 1.9 percent of Mexican GDP, and the corresponding value for U.S. imports from Mexico attributable to NAFTA in that year was 1.7 percent of Mexican GDP.

The substantial decline in the goods trade balance with Mexico since NAFTA went into effect would have happened even without the agreement, according to the simulations (see *Figure 11*). Moreover, NAFTA's effects on the balance have been extremely small in comparison with the fluctuations of the balance that have occurred and in most years have been positive rather than negative. NAFTA is estimated to have reduced the cumulative decline in the annual trade balance from 1993 through 2001 by 2.5 percent in nominal terms and by 3.9 percent in real terms. All of the major fluctuations that have occurred in the goods trade balance with Mexico since the beginning of NAFTA would have occurred anyway if the agreement had not gone into effect, and their magnitudes would have been almost identical to what they were with the agreement.

NAFTA's effect on the trade balance has also been inconsequential in absolute dollar terms and in comparison with the size of the U.S. economy. At no time has the effect been larger than \$1.3 billion, or 0.02 percent of GDP, and it has been positive for the past five years straight.

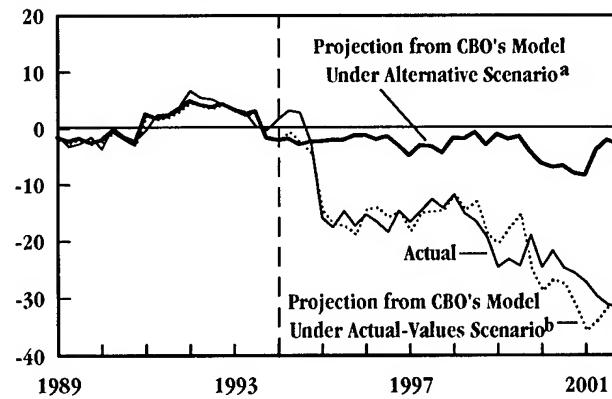
Those results confirm the conclusion stated at the end of Chapter 2 that NAFTA had little to do with the course of events leading to the peso crash in late 1994. In principle, any NAFTA-induced decline in Mexico's trade balance would have increased the downward pressure on the peso. However, the estimated \$0.1 billion effect of NAFTA on the U.S. trade balance with Mexico in 1994 (which means a \$0.1 billion decline in Mexico's balance with the United States) is tiny in comparison with the \$31.8 billion decline that occurred in the net flow of foreign investment into Mexico from the third quarter of 1994 to the fourth quarter. Even if the actual effect of NAFTA on the trade balance were several times that estimated effect, it would still be extremely small in comparison with the investment decline.

The substantial fall in the goods trade balance with Mexico since the agreement went into effect is attributable primarily to fluctuations in the levels of U.S. and Mexican economic activity, with the peso crash playing a small role

**Figure 12.**

### U.S. Goods Trade Balance with Mexico Under Alternative Scenarios

(In billions of dollars)



Source: Congressional Budget Office using data from the Bureau of the Census for the actual trade balance and projections from CBO's model for other trade balances.

Note: The dashed vertical line marks the beginning of the North American Free Trade Agreement on January 1, 1994.

- a. This alternative scenario assumes no peso crash and associated Mexican recession in 1994 and 1995, no prolonged U.S. economic expansion in the 1990s, and no U.S. or Mexican recession in late 2000 and 2001.
- b. The actual-values scenario assumes the values of U.S. gross domestic product, the Mexican industrial production index, and the real exchange rates that actually occurred.

in the earlier years. A simulation from the model produced using actual values for the real exchange rates, the Mexican industrial production index, and real U.S. GDP follows the actual decline in the trade balance reasonably closely (see the line labeled "Projection from CBO's Model Under Actual-Values Scenario" in *Figure 12*, which is the same as the line labeled "Model with NAFTA" in the bottom panel of *Figure 11*). However, if the actual values are modified to eliminate the peso crash, the associated Mexican recession, the prolonged U.S. economic expansion, and the U.S. and Mexican recessions in late 2000 and 2001, the resulting simulation shows essentially no decline in the trade balance (see the line labeled "Projection from CBO's Model Under Alternative Scenario" in *Figure 12*).<sup>5</sup> The balance declines to roughly a \$10 billion deficit in

5. For more-precise details about the assumptions used for that simulation, see Appendix B.

2000, but other than that it remains fairly near zero throughout the 1994-2001 period and ends up in the fourth quarter of 2001 at almost exactly the level it had at the end of 1993. Even the \$10 billion deficit in 2000 is only about one-third of the deficit calculated using actual values for the real exchange rates, U.S. GDP, and the Mexican industrial production index.

Other simulations (not shown) indicate that the peso crash itself had a comparatively minor effect on the trade balance. The largest role was played by the U.S. and Mexican business cycles. Initially, the trade balance plunged in 1995 primarily because of the effect that the severe Mexican recession had on demand for U.S. exports. The peso crash and Mexican recession affected Mexican trade with other countries more than it affected U.S.-Mexican trade. Mexico's imports from the United States declined by 5.3 percent, from a value of \$57.0 billion in 1994 to \$54.0 billion in 1995. Over the same period, its imports from the rest of the world fell proportionately much more—17.4 percent—from \$22.3 billion to \$18.5 billion. Mexico's exports to the United States rose by 28.0 percent over the period, from \$51.9 billion to \$66.5 billion, whereas its exports to the rest of the world increased by 46.2 percent, from \$8.9 billion to \$13.1 billion.

In 1996, demand for U.S. exports started to recover along with the Mexican economy, but the U.S. economic expansion began to increase U.S. imports from Mexico (as well as from other countries). As a result, the balance did not recover substantially; in fact, in 1998, it began falling further. In 2001, the U.S. recession caused imports from Mexico to fall, but the Mexican recession caused U.S. exports to fall by a larger amount, so the trade balance continued to decline.

The long U.S. economic expansion of the 1990s is responsible for most of the trade deficit in 2001. Even with the recent recession, U.S. GDP remained higher in 2001 than it would have been had GDP grown since 1993 at its average growth rate over the previous seven years (see Figure B-3 in Appendix B). That addition to GDP improved the well-being of U.S. residents, but according to another simulation from the model (not shown), it was responsible for over 70 percent of the deficit with Mexico in 2001 and over half of the deficit in the last quarter of 2001. That result further illustrates the fallacy of interpreting

the decline in the trade balance as an indicator that NAFTA has been harmful: not only was the decline not caused by NAFTA, but most of it was caused by something that was (and remains) clearly beneficial—an increase in GDP. Of course, part of the deficit in the last half of 2001 resulted from the Mexican recession, which was (and remains) harmful. There simply is no consistent relationship between the trade balance and economic benefit or harm.

## The Effects of NAFTA on U.S. GDP

NAFTA has had a very small positive effect on U.S. gross domestic product. Estimating that effect precisely requires not only an estimate of the effects of NAFTA on trade with Mexico but also an assessment of the degree of trade diversion (as discussed in Chapter 1) and a model of the effects of trade on the U.S. economy. Such an analysis is beyond the scope of this paper. Trade diversion cannot be assessed using aggregate trade data, such as that analyzed here; it requires analyzing trade on a product-by-product basis. The CBO model does not do that.

It is possible, however, to obtain a rough order-of-magnitude estimate of the effects of NAFTA on U.S. GDP by piggybacking on the results of other studies. In an earlier report, CBO concluded from a survey and analysis of the relevant empirical literature that barriers to trade with big emerging economies (such as those of China, Hong Kong, South Korea, Singapore, Taiwan, and Mexico) cost the U.S. economy somewhere between 5 cents and 35 cents for each \$1 loss of exports.<sup>6</sup> That estimate was obtained from studies showing the converse—that the removal of trade restrictions led to a rise in GDP of 5 cents to 35 cents for each \$1 increase in exports—so it is legitimate to conclude back to that converse. That is, one can multiply the ratio of 5 cents to 35 cents for each \$1 increase in exports by the estimates from CBO's model of how much NAFTA has increased U.S. exports to Mexico to produce a rough estimate of NAFTA's effects on U.S. GDP. Such a method implicitly incorporates the effects of trade diversion because the empirical literature

6. Congressional Budget Office, *The Domestic Costs of Sanctions on Foreign Commerce* (March 1999), p. 42.

**Table 2.****Effects of NAFTA on U.S. Gross Domestic Product**

	Effects in Billions of Dollars	Effects in Percent
1994	0.1 - 0.4	0.001 - 0.005
1995	0.1 - 0.7	0.001 - 0.010
1996	0.2 - 1.3	0.002 - 0.018
1997	0.3 - 2.0	0.004 - 0.026
1998	0.3 - 2.4	0.004 - 0.030
1999	0.4 - 3.0	0.005 - 0.035
2000	0.5 - 3.6	0.006 - 0.042
2001	0.5 - 3.6	0.006 - 0.041

Source: Congressional Budget Office.

that CBO surveyed to obtain the ratio considered trade diversion.<sup>7</sup>

Applying the ratio to the estimates from CBO's model leads to the conclusion that NAFTA has increased U.S. GDP, but by a very small amount—probably no more than a few billion dollars, or a few hundredths of a percent (see *Table 2*). The trade increases wrought by NAFTA raised Mexican GDP by much larger percentages than they raised U.S. GDP—quite likely 16 to 21 times the U.S. percentages—because of the much smaller size of the Mexican economy.<sup>8</sup>

7. Of course, the increase in GDP results from increases in imports as well as exports, and therefore the ratio of the increase in GDP to the increase in exports depends on the increase in imports. Thus, the ratios are valid only if the relative sizes of NAFTA's effects on exports and imports are similar to the relative sizes of those quantities in the studies that CBO surveyed to obtain the ratio. However, that is, in fact, the case. Those studies were primarily examinations of NAFTA produced in the years leading up to the adoption of the agreement. Most of them assumed no change in the trade balance, which is close to the results from CBO's model presented above.

8. From 1997 through 2001, U.S. GDP ranged between 16 and 21 times Mexican GDP. Therefore, the same dollar increase in GDP would be between 16 and 21 times the percentage of Mexican GDP that it would be of U.S. GDP. Although it is probably a good educated guess that the dollar increase in Mexican GDP resulting from NAFTA-induced trade growth is similar in size to the dollar increase in U.S. GDP resulting from that same growth, that guess depends on a number of assumptions that may or may not hold

**A Few Notes About the Results**

Several aspects of CBO's procedure and assumptions—and their effects on the results presented in this paper—merit brief discussion. Those aspects are the use of post-NAFTA data in the estimation of the CBO model's parameters; the assumption that trade barriers would have remained at their 1993 levels in the absence of NAFTA; and the assumption that NAFTA did not affect the real exchange rates, real U.S. GDP, and Mexican industrial production.

**The Use of Post-NAFTA Data**

As noted earlier, the parameters of the model that CBO used to produce the projections and estimates presented above were estimated using data extending from 1989 through 2001. Those years include the post-NAFTA period, which might be a source of concern for some people. However, the resulting conclusions are confirmed and even strengthened by results from another version of the model with parameters estimated using only pre-NAFTA data (see Appendix C).

The reason for choosing 1989 through 2001 concerns a change in the behavior of U.S.-Mexican trade that occurred in the late 1980s. CBO chose to use data from after that change to ensure that the model would reflect the behavior of U.S.-Mexican trade just before NAFTA went into effect. The quantity of data between the change and the beginning of NAFTA was inadequate for estimating the parameters of the model, necessitating the use of additional data from 1994 and after. Some people might wonder whether using the additional data built the post-NAFTA decline in the trade balance into the model. Perhaps if post-NAFTA data containing the decline had not been used in the estimation, the model would not predict that decline (or at least not all of it) without the need for NAFTA. The estimated effects of NAFTA would then include at least some of the decline. Although economists might argue that such a result is unlikely, those of a more skeptical bent could be forgiven for remaining suspicious.

To confirm that this concern and others related to the use of post-NAFTA data are unwarranted, CBO repeated its analysis using a slightly revised version of its model with

true, such as the assumption that Mexican trade diversion resulting from NAFTA is similar in magnitude to U.S. trade diversion.

parameters estimated using data from 1970 through 1993 (just before NAFTA went into effect). As would be expected, simulations from that version of the model track post-NAFTA trade a little less well than do the simulations presented here. Nevertheless, they largely support and even strengthen the conclusions. Of particular interest, they indicate that if U.S.-Mexican trade had behaved the same way in the mid-1990s that it did before the mid- to late 1980s, the decline in the trade balance in response to the peso crash and associated Mexican recession would have been much more drastic than the decline that actually occurred.

### Trade Restrictions in the Absence of NAFTA

The estimates presented here presume that trade barriers in the absence of NAFTA would have remained constant at their 1993 levels. Some people might argue that such an assumption is not appropriate. Because of NAFTA, Mexico did not erect new trade barriers against the United States and Canada during the peso crisis and subsequent recession in 1994 and 1995 as it did against other countries, and as it had done against all countries in the peso crash of 1982. Hence, one could argue that the proper alternative for the "Model Without NAFTA" scenario is some assumed increase in Mexican trade barriers during the crash and subsequent recession. With that alternative, the estimated positive effects of NAFTA on exports would be larger than those presented here for the time that those barriers were in place. Consequently, NAFTA's estimated negative effect on the trade balance in 1995 and 1996 would be smaller—or possibly even positive (depending on the magnitude of the tariff increases and the sensitivity of exports to them).

In addition, some of the reductions in trade barriers agreed to in NAFTA would eventually have occurred anyway as a result of the Uruguay Round agreement of the General Agreement on Tariffs and Trade, which went into effect on January 1, 1995. If those reductions were included in the "Model Without NAFTA" scenario, the estimated effects of NAFTA on exports and imports would be smaller. The change in the estimated effect on the trade balance would depend on the relative magnitudes of the changes in the estimated effects on exports and imports and therefore cannot be determined without actually collecting the relevant tariff data and calculating the effects on exports and imports.

### The Real Exchange Rates, Mexican Industrial Production, and U.S. GDP in the Absence of NAFTA

Producing simulations of exports and imports in the absence of NAFTA requires making assumptions about what the values of the real exchange rates, real U.S. GDP, and the Mexican industrial production index would have been without the agreement. The methodology used to produce the results presented in this paper assumes that those variables would have had the same values in the absence of NAFTA that they actually had in the presence of NAFTA. That assumption is only approximately true. In general, one would expect NAFTA to have affected the variables by amounts that are not precisely known. The effects should be very small, however, and the error introduced by ignoring them should also be very small. (For more details, see Appendix D.) Correcting the error (if it were possible) would very slightly increase the positive estimated effects of NAFTA on exports and the trade balance. The direction of the error for imports is unclear.

### Consistency of CBO's Results with Other Estimates in the Literature

CBO's estimates of NAFTA's effects on U.S.-Mexican trade are generally consistent with estimates from other papers and studies in the literature, including other regression studies, studies using cross-sectional methodologies, and general-equilibrium modeling studies.

### Estimates from Other Regression Studies

Two earlier studies that used statistical regression equations to isolate the effects of NAFTA were published in 1997 and early 1998: one by David M. Gould of the Federal Reserve Bank of Dallas and another by the U.S. International Trade Commission (ITC).<sup>9</sup> Those studies examined effects up through 1996. Gould estimated that exports and imports were higher in that year by \$21.3 billion and \$20.5 billion, respectively, than they would have been in the absence of NAFTA (see Table 3). CBO's

9. David M. Gould, "Has NAFTA Changed North American Trade?" *Economic Review*, Federal Reserve Bank of Dallas (First Quarter 1998), pp. 12-23; and U.S. International Trade Commission, *The Impact of the North American Free-Trade Agreement on the U.S. Economy and Industries: A Three-Year Review*, Publication No. 3045 (July 1997).

**Table 3.****CBO's Estimates of the Effects of NAFTA Compared with Others in the Literature**

	Effects of NAFTA on U.S. Exports to Mexico						Effects of NAFTA on U.S. Imports from Mexico					
	Billions of Dollars		Percent			Billions of Dollars		Percent				
	CBO	Gould	CBO	ITC	GE Models <sup>a</sup>	CBO	Gould	CBO	ITC	GE Models <sup>a</sup>		
1994	1.1		2.2	1.3		0.9		1.9	1.0			
1995	2.0		4.7	3.9		2.9		4.9	5.7			
1996	3.8	21.3	7.2	2.9		4.2	20.5	6.1	6.4			
1997	5.6		8.6			5.4		6.8				
1998	6.9		9.5			6.4		7.2				
1999	8.4		10.8			7.5		7.4				
2000	10.4		10.3			9.1		7.2				
2001	10.3		11.3			9.4		7.7				
Long Run						5.2 - 27.1					3.4 - 15.4	

Sources: Congressional Budget Office; David M. Gould, "Has NAFTA Changed North American Trade?" *Economic Review*, Federal Reserve Bank of Dallas (First Quarter 1998), pp. 12-23; U.S. International Trade Commission, *The Impact of the North American Free-Trade Agreement on the U.S. Economy and Industries: A Three-Year Review*, Publication No. 3045 (July 1997); and U.S. International Trade Commission, *Potential Impact on the U.S. Economy and Selected Industries of the North American Free-Trade Agreement*, Publication No. 2596 (January 1993), p. 2-7.

- a. The range of estimates made by a number of general-equilibrium modeling studies surveyed by the International Trade Commission (ITC), which were published in the years before NAFTA went into effect. Those estimates are for a long-run period that probably exceeds the eight years included in this table.

estimates for 1996—a \$3.8 billion increase in exports and a \$4.2 billion increase in imports—are only about one-fifth as large as Gould's estimates, but they are within the margin of error reported by Gould and thus are not inconsistent with his results.<sup>10</sup>

Gould's export and import estimates imply a positive effect on the trade balance of \$0.8 billion in 1996. Although that number is opposite in sign to CBO's estimated effect for that year (-\$0.4 billion), 1995 and 1996 are the only years for which CBO estimates negative effects on the trade balance. For all other years, CBO's model indicates positive effects on the trade balance of similar magnitude to the effect implied by Gould's export and

import estimates. Furthermore, CBO's estimate is within the margin of error of the number implied by Gould's estimates.

The ITC study estimated that NAFTA increased U.S. exports to Mexico in 1994, 1995, and 1996 by 1.3 percent, 3.9 percent, and 2.9 percent, respectively. The corresponding estimates from the CBO model are 2.2 percent, 4.7 percent, and 7.2 percent, respectively. NAFTA increased imports from Mexico by 1.0 percent, 5.7 percent, and 6.4 percent in those years by the ITC's estimates. The corresponding CBO estimates are 1.9 percent, 4.9 percent, and 6.1 percent. The ITC did not report confidence intervals for its estimates, but clearly its estimates and CBO's are very similar.

10. Gould reported a 90 percent confidence interval for the effect on exports (that is, an interval in which one can be 90 percent confident that the true effect on exports lies) extending from roughly zero to roughly \$32 billion. (The ends of the ranges cannot be given precisely because Gould does not report actual numbers but instead presents rather small graphs from which the numbers can be read only imprecisely.) His 90 percent confidence interval for the effect on imports extends from roughly -\$30 billion to roughly \$48 billion.

Like CBO's numbers, the ITC's estimates for exports and imports imply a positive effect on the trade balance with Mexico in 1994 and negative effects in 1995 and 1996. The ITC study notes the implied positive effect on the balance in 1994; however, rather than make the same comparison for 1995 and 1996, it indicates that the estimates for those two years are less reliable than the esti-

mates for 1994 because of the confounding effects of the peso crash and ensuing Mexican recession.

The ITC estimated its model using data from 1989 through 1996—a range over which almost the only fluctuation of any of the variables was that associated with the peso crash and subsequent recession. The result was to effectively fit the model to the crash and recession. Consequently, the ITC was being properly cautious about whether its model had separated out the effects of the crash and recession with enough accuracy and reliability to draw any valid conclusions about NAFTA's effects on the trade balance in 1995 and 1996. However, CBO's model, which was estimated using a larger range of data that included more fluctuations of the variables, produced similar results. The effects of NAFTA on exports and imports indicated by the two models are very similar in magnitude, and thus the implied effects on the trade balance indicated by the two models are roughly similar in magnitude.

### Estimates Using Cross-Sectional Methodologies

The small magnitudes of CBO's export and import estimates are also consistent with the results of a paper published in January 2000 by Raúl Hinojosa-Ojeda and others.<sup>11</sup> That paper used cross-sectional methodologies (that is, methodologies in which the different data points are different traded products over the same range of time) rather than the time-series methodologies used in this study (in which different data points are the same group of products at different points in time).

In one exercise, that paper divided the various traded products into those for which NAFTA had liberalized trade and those for which it had not (because, for example, there were no trade restrictions to start with, or scheduled liberalization had not yet occurred). The analysis found that U.S. imports of products for which trade had been liberalized had increased by less, on average, than imports of products for which trade had not been liberalized.<sup>12</sup>

11. Raúl Hinojosa-Ojeda and others, *The U.S. Employment Impacts of North American Integration After NAFTA: A Partial Equilibrium Approach* (Los Angeles: North American Integration and Development Center, School of Public Policy and Social Research, University of California at Los Angeles, January 2000).

12. Ibid., pp. 46-48.

That result, which confirmed similar results in earlier papers using less recent data, suggests that the effects of NAFTA's trade liberalization were small in comparison with the effects of other factors that caused trade in various products to increase.

In another exercise, the paper estimated an equation in which the dependent variable was the percentage change in U.S. imports of a given product from Mexico between 1993 and 1998 and the explanatory variables included the decline in the tariff rate and a number of other likely factors. The estimation showed that the decline in the tariff rate was a significant determinant of the increase in U.S. imports but that all of the variables together explained less than 13 percent of the variation in the increase in imports from product to product.<sup>13</sup> Once again, the implication is that the effects of NAFTA's tariff reductions are small compared with the total effects of all of the other factors that influence U.S.-Mexican trade, many of which evidently were not in the regression.

### Estimates from General-Equilibrium Modeling Studies

Finally, CBO's estimates are consistent with the predictions made by general-equilibrium modeling studies before NAFTA went into effect. Unlike statistical regression models, which are based primarily on statistical correlations of various aggregate variables in the recent past, general-equilibrium models explicitly incorporate theoretical assumptions about how various economic actors behave, such as the notion that businesses attempt to maximize their profits and consumers attempt to maximize their economic well-being. Although regression models are usually informed by the kinds of theoretical notions incorporated into general-equilibrium models, and general-equilibrium models are informed by what is known about statistical correlations of the various variables, the two kinds of models are distinct and have different advantages and disadvantages, which CBO has discussed elsewhere.<sup>14</sup>

13. Ibid., pp. 48-50.

14. For more details, see Congressional Budget Office, *Estimating the Effects of NAFTA: An Assessment of the Economic Models and Other Empirical Studies* (June 1993), Appendix A.

The International Trade Commission surveyed a number of general-equilibrium modeling studies and concluded that “[e]stimated increases in U.S. exports to Mexico range from 5.2 to 27.1 percent. U.S. imports from Mexico are estimated to increase by 3.4 to 15.4 percent.”<sup>15</sup> Those estimates were for effects in the very long term, so the most appropriate CBO estimates to compare with them are those for 2001. Those estimates—increases of 11.3 percent for exports and 7.7 percent for imports—are a little lower than the middles of the ranges stated by the ITC (see Table 3).<sup>16</sup>

In 1993, CBO surveyed general-equilibrium modeling studies of the likely effects of NAFTA and stated that the agreement would probably improve the U.S. balance of trade with Mexico.<sup>17</sup> However, that conclusion was based on NAFTA’s likely effects on aggregate saving and investment in the United States and Mexico in conjunction with the accounting identity that equates the current-account balance with the difference between aggregate saving and aggregate investment. Surveying the predictions of the models, CBO concluded that “[u]nfortunately, most of the studies improperly handle investment or saving in Mexico (many assume the trade balance would be unaffected by NAFTA), so it is not possible to say much about the sizes of the effects on the U.S. and world balances of trade with Mexico.” Thus, the CBO results presented here are consistent with predictions from simple economic reasoning, but there is little in the way of sophisticated predictions from pre-NAFTA general-equilibrium modeling with which to compare them.

15. U.S. International Trade Commission, *Potential Impact on the U.S. Economy and Selected Industries of the North American Free-Trade Agreement*, Publication No. 2596 (January 1993), p. 2-7.

16. The equilibria in most of the models surveyed by the ITC are probably longer term than eight years, so CBO estimates for years later than 2001 (if they were available) would be even more appropriate for comparison. CBO’s estimates of the effects of NAFTA are growing over time, so later estimates would undoubtedly be even closer to the middles of the ranges cited by the ITC.

17. Congressional Budget Office, *Estimating the Effects of NAFTA*, pp. 59-61.

CBO’s estimates of the effects of NAFTA on U.S. GDP are consistent with—although in the lower end of—the range of effects predicted by general-equilibrium modeling studies produced before NAFTA began. The meaning of such a comparison is limited, however, by the fact that the results of some of those studies were used to produce the range of GDP-to-export ratios that CBO used to estimate NAFTA’s effects on GDP.

Surveying a number of pre-NAFTA general-equilibrium modeling studies, the ITC summarized their predictions of the likely long-term increases in GDP resulting from NAFTA as ranging from 0.02 percent to 0.5 percent.<sup>18</sup> The summary of predictions in CBO’s 1993 survey, which covered mostly the same modeling studies, largely confirms the ITC’s range.<sup>19</sup> CBO concluded that many of the studies that produced the smaller estimates in the range had left out some of the various mechanisms by which NAFTA might increase GDP.

One reason that CBO’s own estimates of effects on GDP are toward the lower end of the range predicted by the general-equilibrium models may be that most of those models concentrate on effects in the very long term—longer than the eight years estimated by CBO. Alternatively, the general-equilibrium modeling estimates—produced before NAFTA went into effect and not informed by post-NAFTA data—may be a bit too high. Another possibility is that CBO’s crude methodology might have produced underestimates. CBO does not claim that its estimates of effects on GDP are any more accurate than a rough order of magnitude. Regardless, one can conclude that the effects of NAFTA on U.S. GDP have most likely been positive and very small.

18. U.S. International Trade Commission, *Potential Impact on the U.S. Economy and Selected Industries of the North American Free-Trade Agreement*, p. 2-3, Table 2-1.

19. Congressional Budget Office, *Estimating the Effects of NAFTA*, p. 57, Table 11.

## A

## CBO's Model of U.S.-Mexican Trade

**T**o isolate the effects of the North American Free Trade Agreement from the effects of other factors that have influenced U.S.-Mexican trade since the agreement went into effect, the Congressional Budget Office constructed and estimated its own model of that trade. The model and methodology that CBO used were informed in part by the models, methodologies, and results of two earlier studies in the literature—by David Gould, then of the Federal Reserve Bank of Dallas, and by the International Trade Commission (ITC)—that examined NAFTA's effects on U.S.-Mexican trade through 1996.<sup>1</sup>

*Long-term equilibrium equation for exports:*

$$(1) \quad \ln(X_t) = \alpha_0^X + \alpha_1^X \text{TREND}_t + \alpha_2^X \text{CONST81}_t + \alpha_3^X \ln(Y_t^{\text{Mex}}) + \alpha_4^X \ln(TE_t^X) + \alpha_5^X \text{NAFTA}_t + \varepsilon_t^X$$

*Dynamic error-correcting equation for exports:*

$$(2) \quad \Delta \ln(X_t) = \beta_0^X + \beta_1^X \Delta \text{CONST81}_t + \sum_i \beta_{2i}^X \Delta \ln(X_{t-i}) + \sum_i \beta_{3i}^X \Delta \ln(Y_{t-i}^{\text{Mex}}) + \sum_i \beta_{4i}^X \Delta \ln(TE_{t-i}^X) + \beta_5^X \Delta \text{NAFTA}_t + \beta_6^X [\ln(X_{t-1}) - \ln(\overline{X_{t-1}})] + \mu_t^X$$

*Long-term equilibrium equation for imports:*

$$(3) \quad \ln(M_t^{\text{ExclOil}}) = \alpha_0^M + \alpha_1^M \text{TREND}_t + \alpha_2^M \text{TREND80}_t + \alpha_3^M \ln(Y_t^{\text{US}}) + \alpha_4^M \ln(TE_t^M) + \alpha_5^M \text{NAFTA}_t + \varepsilon_t^M$$

1. David M. Gould, "Has NAFTA Changed North American Trade?" *Economic Review*, Federal Reserve Bank of Dallas (First Quarter 1998), pp. 12-23; and U.S. International Trade Commission, *The Impact of the North American Free-Trade Agreement on the U.S. Economy and Industries: A Three-Year Review*, Publication No. 3045 (July 1997).

Dynamic error-correcting equation for imports:

$$(4) \Delta \ln(M_t^{ExclOil}) = \beta_0^M + \beta_1^M \Delta TREND80_t + \sum_i \beta_{2i}^M \Delta \ln(M_{t-i}^{ExclOil}) + \sum_i \beta_{3i}^M \Delta \ln(Y_{t-i}^{US}) + \sum_i \beta_{4i}^M \Delta \ln(TE_{t-i}^M) \\ + \beta_5^M \Delta NAFTA_t + \beta_6^M [\ln(M_{t-1}^{ExclOil}) - \ln(\overline{M}_{t-1}^{ExclOil})] + \mu_t^M$$

where:

$\Delta$	= the first-difference operator;
$\ln()$	= the natural logarithm of the variable in parentheses;
$X_t$	= real U.S. exports to Mexico;
$M_t^{ExclOil}$	= real U.S. imports from Mexico excluding crude oil;
$\overline{X}_t, \overline{M}_t^{ExclOil}$	= the values of $X_t$ and $M_t^{ExclOil}$ predicted by the long-term equilibrium equations (that is, the values calculated from those equations with $\epsilon_t^X$ and $\epsilon_t^M$ set equal to zero);
$Y_t^{US}$	= real U.S. gross domestic product;
$Y_t^{Mex}$	= the Mexican industrial production index (used in place of real Mexican GDP, which was not available for dates before 1980);
$TE_t^X, TE_t^M$	= the tariff-adjusted real exchange rates between the peso and the dollar for exports and imports, respectively (see the data section below for details);
$NAFTA_t$	= a dummy variable (equal to 0 before the beginning of NAFTA and equal to 1 after it) to capture effects of the nontariff provisions of the agreement;
$CONST81_t, TREND80_t$	= artificially constructed variables included to partially rectify certain deficiencies in the available data for 1981 and earlier (see data section below for details);
$\epsilon_t^X, \epsilon_t^M, \mu_t^X, \mu_t^M$	= random error terms; and
$\alpha_j^X, \alpha_{ji}^X, \alpha_j^M, \alpha_{ji}^M$	= statistically estimated coefficients.
$\beta_j^X, \beta_{ji}^X, \beta_j^M, \beta_{ji}^M$	

Crude oil imports were excluded from the import equations because their behavior has differed significantly over time from that of other imports from Mexico. The value of U.S. crude oil imports from Mexico has varied substantially, both in absolute magnitude and in its share of the value of total U.S. imports from Mexico (see *Figure 7 in Chapter 2*). The reasons for that variation—mostly fluctuations in the supply of crude oil from the Middle East and their effects on world oil prices—are captured poorly by the explanatory variables in the import equation. Equations estimated for imports of all goods (including crude oil) did not fit the data as well as the same equations estimated with crude oil excluded. Therefore, CBO decided

to model only nonoil imports and add the actual historical crude oil imports back into the predictions made by the model to obtain predicted total goods imports.

The fact that crude oil imports were not modeled assumes away any effect of NAFTA on U.S. oil imports. It also introduces an error into the predictions of total goods imports (crude oil included) for 1994 through 2001 for cases in which alternative assumptions are made for the real exchange rate and U.S. GDP growth. Those alternative assumptions would be expected to affect crude oil imports, and those effects are not captured by the methodology. However, the resulting error should be small, and

including crude oil in the imports that were modeled would have introduced its own error in the form of a significantly poorer fit of the model to the data.

The error introduced by CBO's methodology should be small for several reasons. First, in only two quarters from 1994 through 2001 did crude oil imports exceed 10 percent of total U.S. goods imports from Mexico, and they did not exceed it by much in those quarters. Second, the U.S. tariff on crude oil before NAFTA was only 5.25 cents per barrel. For Standard Industrial Classification (SIC) 13—crude petroleum and natural gas—calculated duties paid on imports were roughly one-half percent of the dutiable value of imports from Mexico in each year from 1989 through 1993.<sup>2</sup> Thus, the effect of NAFTA's elimination of duties on oil imports from Mexico must accordingly be trivial. The agreement's main effects of significance to the oil industry related not to U.S. import restrictions but to elimination of restrictions on U.S. investment in the Mexican industry. Finally, Saudi Arabia plays a large swing role in the world oil market, deliberately varying its output in response to economic conditions in an attempt to keep the world price at the target level set by OPEC. The result is that U.S. oil imports from Mexico do not vary as much with the U.S. business cycle (and would not vary as much with alternative assumptions about U.S. growth such as those made in Chapter 3 in the analysis of the decline of the trade balance) as would otherwise be the case.

## Data Set and Sources

As noted above, CBO used quarterly data extending from 1969 through 2001. All variables except the nominal exchange rate were seasonally adjusted.<sup>3</sup> In cases in which

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2. "Calculated duties" are an estimate from the Bureau of the Census (in this case obtained by CBO from the Web site of the U.S. International Trade Commission) of the duties paid. They are calculated on the basis of the applicable rate(s) of duty as shown in the Harmonized Tariff Schedule.
  3. For substantial portions of the estimation period the exchange rate was kept constant by the Banco de Mexico, and for much of the rest of the period it was set or highly managed by the Banco de Mexico. Therefore, the nominal exchange rate has reflected policy decisions more than seasonal factors, and seasonal adjustment was not deemed appropriate.

the source data series were not seasonally adjusted, CBO seasonally adjusted them using the Census X-11 routine in SAS.<sup>4</sup>

### Nominal and Real Exports and Imports

Nominal values of total U.S. exports to Mexico (f.a.s. value) and general U.S. imports from Mexico (customs value) for various ranges of years were obtained from the International Trade Commission Web site ([www.usitc.gov](http://www.usitc.gov)), Haver Analytics, and various issues of *Direction of Trade Statistics*, published by the International Monetary Fund. Ultimately, the numbers from all of those sources come from the Bureau of the Census. The customs value of general imports under SIC 13 was then subtracted from total general imports to obtain nominal nonoil imports.

The customs value of SIC 13 imports from Mexico for 1989 through 2001 was obtained from the ITC Web site (and thus ultimately came from the Bureau of the Census). Physical quantities of crude oil imports for 1973 through 2001 and "landed cost" prices for those imports from 1975 through 2001 were obtained from the Energy Information Administration (EIA) of the Department of Energy. Prices from 1973 through 1975 were approximated using the Bureau of Labor Statistics' (BLS's) producer price index for SIC 131—crude petroleum and natural gas. The values of imports calculated from the EIA data and BLS price index were multiplied by the necessary factor to make the average value for 1989 equal to the customs value of general SIC 13 imports for that year. Before 1973, crude oil imports from Mexico were negligible and were assumed to equal the same percentage of total goods imports from Mexico that they did in 1973. The final series consisted of the data from the ITC Web site for 1989 through 2001, the values calculated from the EIA and BLS data and multiplied by the multiplicative factor for 1973 through 1988, and the assumed constant proportion of total goods imports before 1973.

To obtain the real values of exports and nonoil imports, the nominal values were divided by price indices that CBO constructed from chain-weighted price indices for aggregate goods exports to and imports from the entire world

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4. SAS is a package of statistical analysis software produced by the SAS Institute, Inc.

(from the national income and product accounts published by the Bureau of Economic Analysis, or BEA) and from price indices for U.S. exports to and imports from the entire world of various products (from BLS). The import price index that CBO constructed is an index of the price of U.S. imports from the world as a whole of the sorts of products that the United States imports from Mexico. As such, it is a price index for imports that compete with Mexican imports. Similarly, the export index is a price index for U.S. exports to the world of the sorts of goods that the United States exports to Mexico.

Had BLS import and export price indices existed for all products, the aggregate indices for Mexico could have been produced simply by taking the weighted harmonic average of the BLS series (or, equivalently, the straight weighted average inflation rates of those series) with the various component indices weighted by U.S. exports to or imports from Mexico of the product in question for each component index. Values of U.S. trade with Mexico by product at virtually any degree and kind of classification (CBO used primarily three-digit SIC) from 1989 through 2001 are available from the ITC Web site. Values of U.S. trade in manufactured goods by four-digit SIC classification are available from the National Bureau of Economic Research Web site ([www.nber.org](http://www.nber.org)).<sup>5</sup> CBO merged the NBER data to the three-digit level for use in creating its indices.

Unfortunately, there are a number of traded products for which BLS publishes no price indices. Thus, CBO took the harmonic average of the available BLS indices for any given date using U.S. exports to or imports from the world (as appropriate) as weights. That average was then subtracted in harmonic fashion from the BEA chain-weighted index of exports or imports (as appropriate), again using U.S. trade with the world as weights. The residual constituted an aggregate price index for all products for which there were no BLS price indices. That index was then averaged harmonically with the BLS indices, using U.S. trade with Mexico as weights, to obtain the final index.

5. The NBER Web page contains a link to the Center for International Data at the University of California at Davis (<http://data.econ.ucdavis.edu/international/>), where the data set is located. The data set was assembled by Robert Feenstra of the university's Department of Economics under a grant from the National Science Foundation to NBER.

### Other Variables

Values of real U.S. gross domestic product (for  $Y_t^{US}$ ) came from the Bureau of Economic Analysis Web site ([www.bea.gov](http://www.bea.gov)). The Mexican industrial production index (for  $Y_t^{Mex}$ ) was obtained from *International Financial Statistics*, published on CD-ROM and in monthly print versions by the International Monetary Fund.

The tariff-adjusted real exchange rates for exports and imports ( $TE_t^X$  and  $TE_t^M$ ) were calculated by the following formulas:

$$TE_t^X = \frac{\pi_t P_t^{Mex}}{(1 + \tau_t^{Mex}) P_t^{USX}} \text{ and}$$

$$TE_t^M = \frac{\pi_t (1 + \tau_t^{US}) P_t^{Mex}}{P_t^{USM}}$$

where:

$\pi_t$  = the nominal exchange rate in dollars per peso (obtained from *International Financial Statistics*),

$P_t^{Mex}$  = the Mexican wholesale price index (also obtained from *International Financial Statistics*),

$P_t^{USX}$ ,  $P_t^{USM}$  = the dollar price indices that CBO constructed for U.S. exports to and imports from Mexico (see the discussion of real trade values above), and

$\tau_t^{Mex}$ ,  $\tau_t^{US}$  = Mexican and U.S. tariff rates.<sup>6</sup>

6. Nominal and real exchange rates are expressed here in dollars per peso rather than the reciprocal pesos per dollar that is more common in the economics literature in order to be consistent with the usage in the main text of the paper. As noted there, the pesos-per-dollar formulation leads to the confusing result that the peso crash at the end of 1994 appears as an upward spike in a plot of the real exchange rate and to the similarly confusing result that the gradual upward trend in the value of the peso before and after the crash appears as a gradual downward trend in the real exchange rate. To avoid such confusion, the dollars-per-peso formulation is used throughout this paper.

Mexican average tariff rates were obtained from a study by Raúl Hinojosa-Ojeda and others and reports from the Office of the U.S. Trade Representative.<sup>7</sup> Average U.S. tariff rates were computed from data for calculated duties and c.i.f. values of imports obtained from the ITC Web site (which compiled them from Census Bureau data).

Mexican tariff rates before 1982 were not available, so the tariff rate for all dates before 1982 was assumed to be constant and equal to its value in 1982. To allow for the possibility that the actual rate on those dates might have been different from the value in 1982,  $CONST81_t$ , was included in the long-term equilibrium export equation (which, in turn, required including its first difference in the dynamic error-correcting export equation).  $CONST81_t$  is equal to 1 for all dates before 1982 and equal to 0 in that year and thereafter. Its inclusion effectively relaxes the assumption made about the tariff rate before 1982. The rate is still assumed to be constant over that period but may have a different value from the one in 1982. If the actual tariff rate was less than the 1982 value, the coefficient on the variable should be positive. If the actual rate was higher than the 1982 value, the coefficient should be negative.

$TREND80_t$  is another variable made necessary by a limitation of the available data. Many of the BLS price indices that CBO used to construct the U.S. price indices for imports and exports begin in or near 1980. Consequently, the aggregate indices constructed by CBO are little different before 1980 from the BEA chain-weighted price indices for U.S. trade with the world as a whole. That fact is not a problem for the index constructed for exports to Mexico, because that index ended up being almost identical to the BEA chain-weighted index for U.S. exports to the world as a whole even in years for which most BLS price indices were available. That similarity is not surprising because one would expect the exports of

7. Raúl Hinojosa-Ojeda and others, *The U.S. Employment Impacts of North American Integration After NAFTA: A Partial Equilibrium Approach* (Los Angeles: North American Integration and Development Center, School of Public Policy and Social Research, University of California at Los Angeles, January 2000); and Office of the U.S. Trade Representative, *Trade Policy Agenda and Annual Report of the President of the United States on the Trade Agreements Program* (various years).

any country to be determined in large part by what it produces and therefore to be similar from export market to export market, and one would further expect a given exported good to have the same price (in the country from which it is exported) regardless of its country of destination. (The latter expectation is assumed by the methodology that CBO used to construct the index.)

The same could not be said for the import price indices, however. Mexico is a developing country, whereas most U.S. trade is with industrialized countries. Consequently, the mix of products that the United States imports from Mexico is more labor-intensive and more skewed toward agriculture and natural resources (crude oil, for example) than is the mix of U.S. imports from the world as a whole. That difference was more pronounced in the 1970s and early 1980s than in the 1990s and currently. That being the case, one would expect that the prices of U.S. imports from Mexico might behave differently over time from the prices of U.S. imports from the world as a whole and that the difference would probably be more pronounced in the 1970s and early 1980s than in the 1990s and currently.

That expectation is backed up by graphical analysis. A suitably constructed logarithmic plot indicated that CBO's price index for imports from Mexico and the BEA chain-weighted price index for imports from the world as a whole grew at roughly the same rates from 1986 through 2001 and also from 1969 through 1980. However, they grew at different rates from 1981 through 1985. A reasonable interpretation of those facts is that the respective inflation rates were similar from 1986 through 2001 because the large increase in Mexican exports of manufactured goods resulting from Mexico's economic liberalization made the mix of U.S. imports from Mexico more similar to U.S. imports from the world as a whole. Similarity of imports translates to similarity of price behavior. Before 1986, the mix of U.S. imports from Mexico was different from that of U.S. imports from the world as a whole, which translates to different prices and quite likely different inflation rates. The inflation rates presumably were different from 1969 through 1980 also, but the index constructed by CBO could not show that difference because the lack of BLS indices before 1980 means that the CBO index is nearly identical to the BEA chain-weighted index for those years.

The problem with the CBO import index before 1980 enters the model in two places: the construction of the tariff-adjusted real exchange rates, and the deflation of nominal imports from Mexico to real imports. Because the problem relates to a constant rate of change over time, it has the character of a spurious trend before 1980. To capture that spurious trend and keep it from affecting the various coefficient estimates and distorting the fit of the model, *TREND80*, was constructed and included in the model. That variable consists of an upward time trend from 1969 through the first quarter of 1980, at which time its value is equal to zero. From that point on, its value remains equal to zero.

## Estimation of the Model

Because the behavior of U.S.-Mexican trade changed in the late 1980s (as described in Appendix C), CBO estimated two versions of its model. The first, or *standard*, version was estimated over data from the first quarter of 1989 through the fourth quarter of 2001—entirely after the change in behavior occurred. The variables *CONST81*, and *TREND80*, were unnecessary in that version and were therefore excluded. Because the data set for that version lies entirely after the change in behavior, the model reflects the behavior of trade at the time NAFTA went into effect.

The second, or *alternative*, version of the model was estimated over an earlier range: from the first quarter of 1970 through the fourth quarter of 1993. (The need to include four lags of the first differences, which is discussed below, prevented the use of observations in 1969.) That range is entirely before NAFTA, so the alternative version of the model is not subject to the criticism that major effects of the agreement might have been built into it. To avoid any question about effects of NAFTA possibly being built into the model through the coefficient estimates, the true values of leads of the first differences extending beyond 1993 into the post-NAFTA time period were replaced with the average of the first differences of the same variables in 1993. The dummy variable *NAFTA*, was not needed for the alternative version and was therefore excluded.

The two long-term equilibrium equations were estimated by maximum likelihood with correction for first-order

serial correlation in the error term. The dependent variables and some of the independent variables in the equations are actually determined by a simultaneous-equations system. Unlike the case of stationary time series, standard single-equation estimation techniques such as ordinary least squares or maximum likelihood give consistent results even in simultaneous-equations systems when the variables are co-integrated.<sup>8</sup> That is, in the limit as the data sample gets infinitely large, the coefficient estimates produced by the techniques approach the true values of the coefficients.

Nevertheless, the estimates can be severely biased for finite sample sizes, and the bias often declines slowly as the sample size increases. The bias can be corrected, however, by including leads and lags of the first differences of the independent variables as additional independent explanatory variables in the equations to be estimated.<sup>9</sup> The added terms are used only during estimation of the long-term equations; after that, the terms are removed before the equations are used to produce long-term values for insertion into the dynamic error-correcting equations.

In accordance with that methodology, CBO included four leads and four lags of the first differences of  $Y_t^{Mex}$  and  $TE_t^X$  when estimating the equilibrium export equation for 1970 through 1993, and it did the same for  $Y_t^{US}$  and  $TE_t^M$  in the equilibrium import equation for that time period. The same procedure was tried with the equations for 1989 through 2001, but the resulting decline in the degrees of freedom resulted in large error bars and consequent nonsensical values for some of the coefficients. In particular, the coefficient estimate for the real exchange rate in the export equation had the wrong sign (but was insignificantly different from zero), and the coefficient estimates for the dummy variables in both equations were negative (but insignificantly different from zero).

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8. See John Y. Campbell and Pierre Perron, *Pitfalls and Opportunities: What Macroeconomists Should Know About Unit Roots*, Technical Working Paper No. 100 (Cambridge, Mass.: National Bureau of Economic Research, April 1991), pp. 47-48.

9. *Ibid.*, p. 51.

The nonsensical values made it impossible to use the estimates in the model to achieve results that made any sense. Therefore, the equations for 1989 through 2001 were estimated without the bias correction procedure. As a result, the coefficient estimates for the real exchange rate may be biased upward. The coefficients for the dummy variables appeared to change in such a direction as to at least partially offset the change in the coefficients for the real exchange rates, however. Thus, the coefficient on the tariff-adjusted real exchange rate was larger without the correction, which produced stronger estimated effects for the tariff provisions of NAFTA; but the coefficients on the dummy variables were smaller and, hence, produced smaller estimated effects for the nontariff provisions. Consequently, the error in the estimated total effect of NAFTA—if there is one—may be smaller than the error produced by the bias in the real exchange rate coefficient.

The coefficient estimates and statistics, excluding those for the leads and lags of the first differences, are shown in *Table A-1*. The values of R squared are included in the tables, but their meaning in the 1970-1993 equations is open to question because of the first-difference variables.

The dynamic error-correcting equations were estimated using ordinary least squares over the same time period used for the long-term equations. The residuals calculated from the long-term equations with the first differences excluded were used for the lagged long-term error variable. The equations were estimated first with a number of lags of each variable that exceeded what seemed likely to be needed, and the most distant lags were successively eliminated as dictated by their t statistics and their effects on the adjusted R squared. The coincident value was similarly eliminated as dictated. The coefficient estimates and statistics are shown in *Table A-2*.

**Table A-1.**
**Estimates and Statistics for Long-Term Equilibrium Equations  
for U.S.-Mexican Trade**

	1970-1993				1989-2001			
	Coefficient Estimate	Standard Error	t Statistic	Probability > t	Coefficient Estimate	Standard Error	t Statistic	Probability > t
<b>U.S. Goods Exports to Mexico</b>								
Intercept	5.6541	1.5369	3.68	0.0004	3.8522	1.1571	3.33	0.0017
<i>TREND</i>	0.0259	0.0188	1.38	0.1730	0.0535	0.0102	5.24	<0.0001
<i>CONST81</i>	0.1207	0.0909	1.33	0.1886				
<i>ln(Y<sup>MEX</sup>)</i>	1.3662	0.3458	3.95	0.0002	1.5453	0.2411	6.41	<0.0001
<i>ln(TE<sup>U</sup>)</i>	1.0254	0.1808	5.67	<0.0001	0.2691	0.0818	3.29	0.0019
<i>NAFTA</i>					0.0756	0.0370	2.04	0.0468
Serial Correlation of Error	0.7763	0.0769	10.10	<0.0001	0.6873	0.1230	5.59	<0.0001
<b>Memorandum:</b>								
Degrees of Freedom	74				46			
Regression R Squared	0.9126				0.9618			
Total R Squared	0.9935				0.9951			
Durbin-Watson	2.1523				2.0045			
Probability >Durbin-Watson	0.2849				0.6138			
<b>U.S. Goods Imports from Mexico (Excluding crude oil)</b>								
Intercept	-15.4408	5.5635	-2.78	0.0070	-18.2128	5.6264	-3.24	0.0022
<i>TREND</i>	0.0805	0.0195	4.12	<0.0001	0.0585	0.0204	2.86	0.0063
<i>TREND80</i>	-0.1591	0.0163	-9.74	<0.0001				
<i>ln(Y<sup>U</sup>)</i>	2.8774	0.6286	4.58	<0.0001	3.2464	0.6362	5.10	<0.0001
<i>ln(TE<sup>M</sup>)</i>	-0.5303	0.1461	-3.63	0.0005	-0.1211	0.0705	-1.72	0.0925
<i>NAFTA</i>					0.0710	0.0348	2.04	0.0471
Serial Correlation of Error	0.3902	0.1078	-3.62	0.0005	0.6582	0.1337	4.92	<0.0001
<b>Memorandum:</b>								
Degrees of Freedom	74				46			
Regression R Squared	0.9852				0.9806			
Total R Squared	0.9942				0.9973			
Durbin-Watson	1.9880				1.7687			
Probability >Durbin-Watson	0.6627				0.8756			

Source: Congressional Budget Office.

**Table A-2.**
**Estimates and Statistics for Dynamic Error-Correcting Equations  
for U.S.-Mexican Trade**

	1970-1993				1989-2001			
	Coefficient Estimate	Standard Error	t Statistic	Probability > t	Coefficient Estimate	Standard Error	t Statistic	Probability > t
<b>U.S. Goods Exports to Mexico</b>								
Intercept	0.0118	0.0076	1.57	0.1210	0.0191	0.0072	2.66	0.0110
$\Delta \text{CONST81}$	0.1998	0.0635	3.15	0.0023				
$\Delta \ln(Y^{\text{MEX}})$ Lag0	1.0643	0.2883	3.69	0.0004	1.5068	0.2922	5.16	<0.0001
$\Delta \ln(Y^{\text{MEX}})$ Lag1	0.4215	0.2837	1.49	0.1410	0.7556	0.2759	2.74	0.0089
$\Delta \ln(TE^{\text{X}})$ Lag1	0.3819	0.1210	3.16	0.0022	0.2569	0.0763	3.37	0.0016
$\Delta \ln(TE^{\text{X}})$ Lag2	0.3136	0.1164	2.69	0.0085	0.0076	0.0901	0.08	0.9327
$\Delta \ln(TE^{\text{X}})$ Lag3	0.0638	0.1118	0.57	0.5697	-0.2766	0.0884	-3.13	0.0031
$\Delta \ln(TE^{\text{X}})$ Lag4	-0.3317	0.1107	-3.00	0.0036				
$\Delta \text{NAFTA}$					0.0544	0.0353	1.54	0.1306
$[\ln(X) - \ln(\bar{X})]$ Lag1	-0.1800	0.0671	-2.68	0.0087	-0.1310	0.0682	-1.92	0.0613
<b>Memorandum:</b>								
Degrees of Freedom	86				43			
R Squared	0.5246				0.6854			
Adjusted R Squared	0.4804				0.6341			
Durbin-Watson	2.230				2.075			
<b>U.S. Goods Imports from Mexico (Excluding crude oil)</b>								
Intercept	-0.0023	0.0123	-0.19	0.8535	0.0127	0.0106	1.19	0.2388
$\Delta \text{TREND80}$	-0.0790	0.0584	-1.35	0.1794				
$\Delta \ln(Y^{\text{US}})$ Lag0	1.4513	0.7673	1.89	0.0619	2.9120	0.9321	3.12	0.0032
$\Delta \ln(Y^{\text{US}})$ Lag1	0.7409	0.7876	0.94	0.3495	3.6955	0.8840	4.18	0.0001
$\Delta \ln(Y^{\text{US}})$ Lag2	1.0489	0.7832	1.34	0.1840	-0.8290	0.9845	-0.84	0.4044
$\Delta \ln(Y^{\text{US}})$ Lag3	0.4212	0.7902	0.53	0.5954	-1.0402	0.9203	-1.13	0.2646
$\Delta \ln(Y^{\text{US}})$ Lag4	1.4357	0.7753	1.85	0.0675				
$\Delta \ln(TE^{\text{M}})$ Lag0	-0.3030	0.1300	-2.39	0.0188				
$\Delta \ln(TE^{\text{M}})$ Lag1					0.0977	0.0649	1.51	0.1393
$\Delta \ln(TE^{\text{M}})$ Lag2					-0.0983	0.0665	-1.48	0.1467
$[\ln(M^{\text{Excl}}) - \ln(M^{\text{Excl}})]$ Lag1	-0.6074	0.1031	-5.89	<0.0001	-0.2138	0.1083	-1.97	0.0548
<b>Memorandum:</b>								
Degrees of Freedom	86				43			
R Squared	0.2999				0.4729			
Adjusted R Squared	0.2583				0.3870			
Durbin-Watson	2.052				1.812			

Source: Congressional Budget Office.

## B

## Assumptions for the Alternative Scenario in Chapter Three

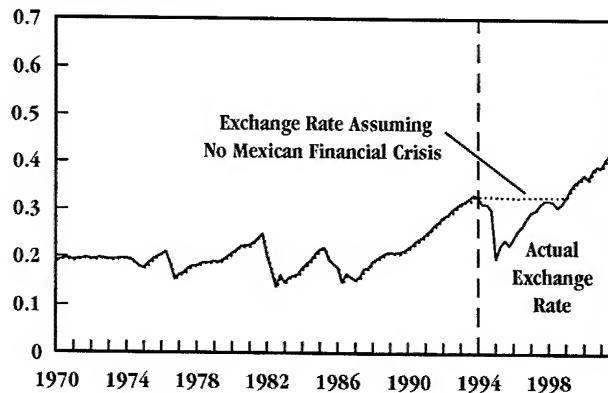
To determine the cause of the substantial decline in the U.S. trade balance with Mexico since the North American Free Trade Agreement went into effect, Chapter 3 compared two simulations from the Congressional Budget Office's model. A simulation produced using actual historical values for the determinants—that is, for the real exchange rates, the Mexican industrial production index, and real U.S. gross domestic product—tracked the actual decline in the trade balance reasonably closely. However, when the actual values of the determinants were modified to eliminate the late-1994 peso crash, the associated Mexican recession, the prolonged U.S. economic expansion, and the U.S. and Mexican recessions in late 2000 and 2001, the resulting simulation showed essentially no decline in the trade balance. This appendix gives the precise details of the assumed values that were used for the second simulation.

For that simulation, the real value of the peso was assumed to have remained constant from the fourth quarter of 1993 through the first quarter of 1999 (the last quarter before the actual rate finally recovered to a level higher than the value in the fourth quarter of 1993). After that, it was assumed to have equalled the real values that actually occurred (see *Figure B-1*).<sup>1</sup>

1. To be precise, prices were assumed to have the values that they actually had, and the nominal exchange rate was adjusted so that the real exchange rate for exports remained constant. The same nominal exchange rate was then used in the import equations, which means that the real exchange rate for imports was not exactly constant but was very close to being constant.

**Figure B-1.**  
**Real Exchange Rate for U.S. Goods Exports to Mexico Under Alternative Scenarios**

(In dollars per peso)



Source: Congressional Budget Office.

Notes: For information about how CBO calculated the real exchange rate, see Figure 8 on page 13.

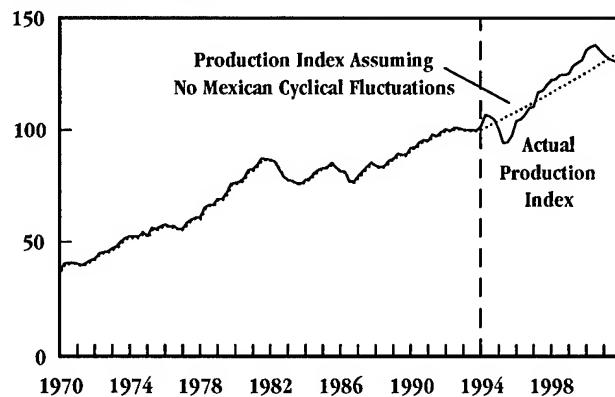
The dashed vertical line marks the beginning of the North American Free Trade Agreement on January 1, 1994.

The Mexican industrial production index, rather than taking the values it actually took after the fourth quarter of 1993, was assumed to have grown over that period at its average rate of growth from the fourth quarter of 1986 through the fourth quarter of 1993 (see *Figure B-2*). The starting point for that range was chosen because it was the trough of the previous Mexican recession. The end of the range was also close to a recession trough, so the average

**Figure B-2.**

## Mexican Industrial Production Index Under Alternative Scenarios

(Index, 1993 = 100)



Source: Congressional Budget Office. Actual values for the index come from International Monetary Fund, *International Financial Statistics*.

Note: The dashed vertical line marks the beginning of the North American Free Trade Agreement on January 1, 1994.

over the range gives the average growth rate over a business cycle from trough to trough. The reasonableness of that average for the alternative is supported by the fact that it produces a path for the industrial production index after 1993 that looks very much like a trend about which the actual index fluctuates.

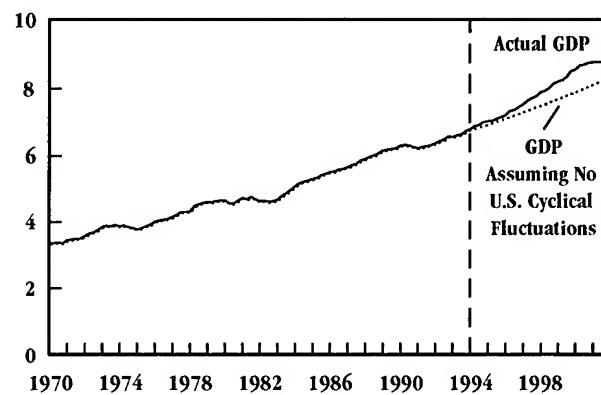
U.S. GDP was assumed to have grown after 1993 at its average rate of growth over the same time period used for

the Mexican industrial production index (see *Figure B-3*). That period includes the U.S. recession of 1990-1991 as well as a number of years of economic expansion, so it should have a reasonable average growth rate. The reasonableness of the rate is bolstered by the fact that the resulting assumed values of GDP are similar to the values that actually occurred for several years after 1993, not deviating significantly from them until 1997.

**Figure B-3.**

## Real U.S. GDP Under Alternative Scenarios

(In trillions of dollars)



Source: Congressional Budget Office. Actual values for gross domestic product come from the Bureau of Economic Analysis.

Note: The dashed vertical line marks the beginning of the North American Free Trade Agreement on January 1, 1994.

## C

## Results from the Model Estimated Using Only Pre-NAFTA Data

**T**he results and conclusions presented in Chapter 3 were produced using the Congressional Budget Office's model with parameters estimated over data from the first quarter of 1989 through the last quarter of 2001 (referred to in this appendix and in Appendix A as the *standard* model or methodology). The 1989-2001 interval was chosen for the standard model because of a shift in the structure of production and trade across the U.S.-Mexican border that occurred in the late 1980s. Before the shift, Mexico imported primarily intermediate goods for input into the production of goods for its own domestic consumption by domestic manufacturers protected by high tariffs, import quotas, and restrictions on foreign investment. Its exports were heavily oriented toward mining and agricultural products and crude oil. The shift consisted of a large increase in the importation of intermediate goods for use in the production of finished goods for export back to the United States.<sup>1</sup> The increase resulted from U.S. and Mexican tariff preferences granted to such trade and, more generally, from the Mexican trade and other economic liberalization that began in the mid-1980s, of which NAFTA was a significant but comparatively small and late part.<sup>2</sup> In effect, a portion of the production pro-

cess for goods destined for U.S. consumers was shifted to Mexico, creating new trade in the intermediate and final goods involved.

The shift in production and trade caused significant changes in the sensitivities of trade to its various determinants in the late 1980s. To ensure that the standard model reflected the sensitivities that were current when NAFTA went into effect, it was necessary to use only data from after the shift. Further, the quantity of data between the time of the shift and the beginning of NAFTA on January 1, 1994, was inadequate for estimating the parameters of the model, necessitating the use of additional data from the post-NAFTA period.

The results from the standard model should be reasonably accurate and reliable. However, some people might question whether the reason that the model accurately tracks the substantial post-NAFTA decline in the trade balance over time—and thus attributes it to factors other than the agreement—is that the use in the estimation procedure of post-NAFTA data containing the decline effectively estimated it into the parameters of the model.<sup>3</sup> Although

1. See Raúl Hinojosa-Ojeda and others, *The U.S. Employment Impacts of North American Integration After NAFTA: A Partial Equilibrium Approach* (Los Angeles: North American Integration and Development Center, School of Public Policy and Social Research, University of California at Los Angeles, January 2000), pp. 42-44 and Figure 4.11.

2. The tariff preferences consisted of Mexico's waiving of tariffs on goods imported into Mexico for input into the production of goods

that were reexported, and the United States' waiving of tariffs on the percentage of the value of imports represented by components produced in the United States.

3. More generally, although the effect is not likely to be large, NAFTA could have changed the sensitivities of trade to its various determinants. Most of the data used for estimation being post-NAFTA, the parameter estimates reflect primarily the post-NAFTA sensitivities. Consequently, to the extent that the effects of NAFTA

economists might argue that that is not the reason, the results would be more convincing if the data set used for estimating the parameters did not include the decline.

In addition, one so-called dummy variable was used in the standard methodology to capture the effects of non-tariff provisions of NAFTA over the entire eight years of post-NAFTA data. Because the agreement's provisions were phased in over time, there is no reason to expect that the effects of the nontariff provisions would be unchanging throughout those eight years as the use of only one such variable presumes. In principle, more dummy variables could have been used, such as one for each post-NAFTA year or for each two-year post-NAFTA period. However, the use of more than one dummy variable resulted in large statistical error margins for the estimates for those variables' coefficients and produced nonsensical results.<sup>4</sup>

To preclude any doubts, CBO repeated the analysis described in Chapter 3 using a slightly revised version of its model (referred to as the *alternative* model or methodology). In that version, the parameters were estimated using only pre-NAFTA data—specifically, data extending from 1970 through 1993.<sup>5</sup> The use of only pre-NAFTA data eliminates the possibility of the estimation procedure's essentially custom-designing the model to predict the post-NAFTA decline in the trade balance and thereby attribute the decline to factors other than NAFTA. It all but eliminates the possibility of *any* significant effects of NAFTA

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take the form of changes in sensitivities of trade to its determinants, the model will confound some of the effects of NAFTA with the effects of changes in the exchange rate, prices, or other determinants of trade that occurred for reasons other than NAFTA.

4. As a matter of theory, the coefficient of each succeeding dummy variable over time should be as large as or larger than the coefficient of the dummy variable preceding it to reflect the fact that trade restrictions are being progressively liberalized over time, resulting in more trade. Because of the large statistical error in the estimates, that result was not the case for some of the variables, with noticeable effects on the simulations.
5. The revisions consisted of eliminating the dummy variable, which is needed only for (and can be estimated only with) post-NAFTA data, and including variables to offset certain problems with the data prior to 1981.

being estimated into the model and consequently attributed falsely to other factors.<sup>6</sup> It also eliminates the need for any dummy variables for the effects of NAFTA's non-tariff provisions and, in so doing, does away with the problem that the standard methodology uses only one dummy variable for the entire eight-year period after NAFTA.

The alternative model can be used to produce simulations of what trade would have been in the absence of NAFTA and of what it would have been with NAFTA's tariff reductions but none of the agreement's other provisions. However, because the model has no dummy variables to capture the effects of nontariff provisions, it cannot produce simulations of trade in the presence of all of NAFTA's provisions. Consequently, the method used to determine the effects of NAFTA with the standard model must be modified slightly for the alternative model. The procedure with the standard model was to compare the model's prediction of trade in the absence of NAFTA with

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6. NAFTA could nevertheless affect the estimated coefficients of the model, but the effects would be extremely small—much too small to make the model predict the post-NAFTA decline in the trade balance and attribute it to other factors if that decline were indeed caused by NAFTA. Before the agreement became effective, the knowledge that it would soon do so undoubtedly led to increased investment flows between the United States and Mexico. Those investment flows would have raised the real value of the peso relative to the dollar and thereby increased Mexican demand for U.S. exports and reduced U.S. demand for imports from Mexico. However, that effect would not have significantly altered the sensitivities of exports and imports to the real value of the peso or to the real values of U.S. and Mexican incomes, which are the parameters of the model estimated from the data. The investment flows would also have increased Mexican demand for investment goods. Depending on how much of the higher demand was satisfied by U.S. exports to Mexico, that effect could have raised slightly the level of U.S. exports to Mexico estimated into the model for given levels of the real value of the peso and real Mexican income. That effect might lead the model to underestimate very slightly NAFTA's positive effect on exports. There should be no significant effect on the sensitivities of trade to the value of the peso and Mexican income. Whatever slight effects NAFTA might have had on coefficients of the model by any of those mechanisms would be made even smaller by the fact that expectations of the coming agreement would have had significant effects on investment flows only in the last two to four years of the 24-year estimation period. Thus, the coefficients overwhelmingly reflect the behavior of trade before those expectations became significant.

its *prediction* of trade in the presence of NAFTA. With the alternative model, the prediction of trade in the absence of NAFTA must be compared with the *actual* historical trade in the presence of NAFTA.

Built into the standard methodology was the assumption that NAFTA did not affect the real exchange rates, real U.S. gross domestic product, and the Mexican industrial production index. That assumption is not built into the alternative methodology, but some assumption must be made about the values of those variables in the absence of NAFTA in order to make projections of what trade would have been. CBO chose the same assumption that was built into the standard methodology. That assumption has the same implications for the results of the alternative methodology as it does for the results of the standard methodology (implications that are discussed in Chapter 3 and Appendix D).

Also like the standard methodology, the alternative methodology assumes that trade barriers in the absence of NAFTA would have remained constant at their 1993 levels. The implications of that assumption are the same for the results presented below as they are for the results of the standard methodology (also discussed in Chapter 3).

## The Effects of NAFTA on U.S.-Mexican Trade

Most of the years over which the parameters of the alternative model were estimated predate the shift in production and trade structure, so the model reflects primarily the preshift sensitivities of U.S.-Mexican trade to its various determinants. Therefore, simulations from that model track the post-NAFTA fluctuations in trade a little less accurately, and are a little more difficult to interpret, than those from the standard model. Nevertheless, properly interpreted, the simulations largely support and strengthen the conclusions presented in Chapter 3.

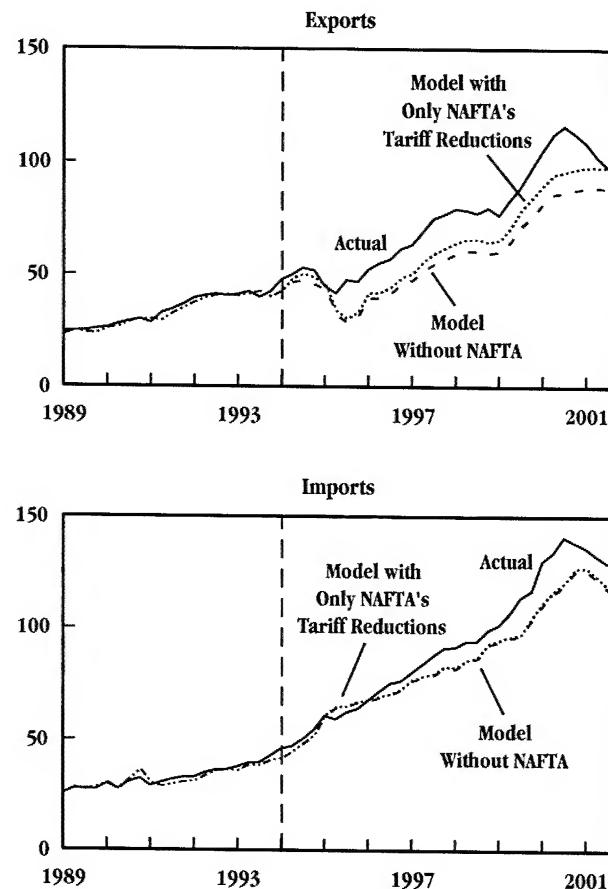
### Effects on Exports and Imports

Simulations from the alternative model indicate that, except for imports during a short period from early 1995 to early 1996, both exports and imports have been higher by increasing amounts over time than the model predicts

**Figure C-1.**

### U.S. Goods Trade with Mexico by CBO's Alternative Methodology

(In billions of dollars)



Source: Congressional Budget Office using data from the Bureau of the Census for actual values and projections from CBO's model for other values.

Note: The dashed vertical lines mark the beginning of the North American Free Trade Agreement on January 1, 1994.

they would have been in the absence of NAFTA (see *Figure C-1*). The implied effects of NAFTA are a bit larger than those indicated by the simulations from the standard model; nevertheless, the simulations from the alternative model, like those from the standard model, indicate that the vast bulk of the increases in trade since NAFTA have happened for reasons other than the agreement. Eighty percent of the growth in annual goods exports to Mexico from 1993 to 2001 and 90 percent of the growth in annual goods imports from Mexico over the same period

would have occurred even if NAFTA had not been implemented. The corresponding percentages for the standard model were 85 percent and 91 percent, respectively.

Although the alternative model does not track the fluctuations in trade over time as well as the standard model does, the fluctuations that have actually happened in the presence of NAFTA have nevertheless been similar to those that the alternative model indicates would have occurred in the absence of NAFTA with two exceptions. The first exception is that the model indicates a larger decline in exports with the peso crash and Mexican recession, and a larger rise in imports, than actually occurred. The second exception is that the model indicates a less severe drop in exports in 2001 than actually occurred.

The exceptions can be explained, at least qualitatively, by the shift in the structure of U.S.-Mexican production and trade in the late 1980s. One would expect the shift to (among other things) make both U.S. exports to and imports from Mexico less sensitive to the exchange rate and to other price variables such as tariffs. Imports would become less sensitive because the exchange rate would affect the cost of only that portion of the final product price in the United States that results from the cost of assembly in Mexico and not the portion that represents the cost of the components made in the United States and exported to Mexico.

Exports would become less sensitive because Mexican demand for them would become dependent primarily on U.S. demand for the final product exported back to the United States rather than on the exchange rate, and as just stated, U.S. demand for imports of that final product would become less sensitive to the exchange rate. Furthermore, what little effect would arise in that manner would be in the opposite direction to the previous effect of exchange rates on Mexican demand for U.S. exports. A rise in the value of the peso would slightly reduce U.S. demand for imports from Mexico, which in turn would lower Mexico's demand for U.S. exports. Previously, one would have expected a rise in the peso to have made U.S. exports less expensive to Mexico and therefore cause them to increase. That effect undoubtedly still occurs for the portion of exports not destined for use in products that will be exported back to the United States. However, it is offset to some degree by the negative effect on exports

that are so destined, reducing the sensitivity of exports to the exchange rate. Both the United States and Mexico give substantial tariff breaks on trade in which U.S.-made intermediate goods are shipped to Mexico for assembly and then shipped back to the United States, so the sensitivity of trade to tariff changes would also be reduced.

The alternative model reflects mainly the earlier, higher sensitivities of exports and imports to the real exchange rate. Those higher sensitivities explain, at least qualitatively, the two exceptions discussed above. First, the higher sensitivities of both exports and imports explain why the model projects a larger decline in exports and increase in imports than actually occurred in 1995 and 1996 with the peso crash and associated Mexican recession.<sup>7</sup> Second, the higher sensitivity of exports explains why the model underpredicts the downturn of exports resulting from the Mexican recession of late 2000 and 2001. During that period, the real exchange rate rose significantly while the Mexican industrial production index declined. The model's overreaction to the rise in the real exchange rate (which, all else being equal, would make exports rise) offsets the fall in exports resulting from the decline in the

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7. An additional factor that is attributable to NAFTA may contribute to the model's prediction of a larger decline in exports than actually occurred in 1995 and 1996. During that period, Mexico raised tariffs significantly on imports from other countries but did not do so for imports from the United States and Canada because of the agreement. The resulting reduction of international competition for U.S. and Canadian producers means that U.S. and Canadian exports probably fell less than they would have otherwise. Had a good price index for competing goods in the Mexican market been available to include in the CBO model, that index would likely have risen because of the reduced competition and thereby led the model to predict that effect. However, the best Mexican price index available for use in the model was the wholesale price index, which probably was not accurate enough to pick up the effect. It is doubtful that the effect was very large because the vast bulk of Mexican imports already came from the United States before the tariff increase. In principle, the effect should show up in the simulations from the standard model as well, but in fact it is not noticeable in them. One reason might be that the effect is too small to be noticeable. Alternatively, the estimation of the standard model using data that includes the decline may have served to fit the model to the smaller net decline that resulted from the superposition of the effect on the larger decline that would otherwise have happened if Mexico had not raised tariffs on other countries. If so, even a large effect would not appear as a difference between actual imports and simulations from the model.

industrial production index. Consequently, the rise in exports predicted by the model merely decelerates rather than reversing into a downturn as exports actually did.

Excluding the exceptions just discussed, exports and imports have both been higher by gradually increasing amounts since NAFTA went into effect than the alternative model predicts they would have been in the absence of NAFTA, and the amount by which they have been higher is a bit larger than was the case for the standard model. Those increments to trade indicated by the alternative model may be only partially attributable to NAFTA, however. The reason is that they may contain increases in trade resulting from the shift in the structure of production and trade in the late 1980s. In addition to changing the sensitivities of U.S.-Mexican trade to its various determinants, the shift caused increases in both exports and imports for given values of those determinants. Most of the data used to estimate the parameters of the alternative model preceded the shift in trade structure, so the model reflects primarily the lower levels of trade for given values of the determinants that existed before the shift. Therefore, as an estimate of the effects of NAFTA, the difference between the "Actual" and "Model Without NAFTA" lines in Figure C-1 may tend to be too large.

Further support for the notion that the difference between those two lines is too large comes from the third line in the figure, labeled "Model with Only NAFTA's Tariff Reductions." The difference between that line and the one labeled "Model Without NAFTA" represents the effect on trade of the tariff reductions. That effect is only a small part of the difference between "Actual" and "Model Without NAFTA" in each panel of the figure. The rest—the difference between "Actual" and "Model with Only NAFTA's Tariff Reductions"—represents the changes in trade resulting from NAFTA's other provisions (elimination of trade quotas and investment restrictions) and some portion of the rise resulting from the shift in the production and trade structure.

It was not possible to determine precisely how much of the difference between "Actual" and "Model with Only NAFTA's Tariff Reductions" results from NAFTA's elimination of trade quotas and investment restrictions and how much results from the change in the production and trade structure or perhaps other causes. However, given the

comparatively small size of the effects of NAFTA's tariff reductions, it would seem unlikely that the effects of NAFTA's elimination of trade quotas and investment restrictions would make up very much of the difference. That possibility would appear even more unlikely when one considers that the estimated effects of the NAFTA tariff reductions are probably too large because the model reflects mainly the earlier, higher sensitivities of trade to relative price variables such as the real exchange rate and tariffs. It would be still more unlikely in the case of imports because the United States had very little in the way of trade quotas and investment restrictions for NAFTA to eliminate.

By the alternative methodology, exports were 10.4 percent higher in 1994 than they would have been in the absence of NAFTA, ranged between 26 percent and 34 percent higher from 1995 through 2000, and were 13.2 percent higher in 2001 (*see Table C-1*). In dollar terms, they were \$4.8 billion (or 0.07 percent of GDP) higher in 1994 and rose gradually to \$25.4 billion (0.29 percent of GDP) higher by 2000 before easing back to \$11.8 billion (0.13 percent of GDP) higher in 2001.

Correcting for the change in sensitivity of exports to the real exchange rate would change the pattern of the estimates over time to something more like a smooth upward trend, although there might be some decline in the last year with the recession. The increases would range from a little over 10 percent (roughly \$5 billion, or 0.07 percent of GDP) in 1994 to roughly 25 percent to 30 percent (about \$22 billion to \$26 billion, or 0.25 percent to 0.30 percent of GDP) in 2001. Those numbers are mostly in a range of roughly 2.5 to 5 times the size of the effects estimated by the standard methodology. However, as noted above, they may include not only the effects of NAFTA but also some portion of the increases resulting from the shift in the structure of production and trade in the late 1980s.

Imports were also generally higher by the alternative methodology than they would have been without NAFTA, but by a smaller amount than was the case for exports. They were 5.2 percent higher in 1994, fell to 4.7 percent lower in 1995, and then rose gradually to 14.6 percent higher in 2000 before falling back to 8.6 percent higher (*see Table C-1*). In dollar terms, they were \$2.5 billion (or

**Table C-1.**
**Effects of NAFTA on U.S. Goods Exports to and Imports from Mexico by CBO's Standard and Alternative Methodologies**

	Effects in Billions of Dollars		Effects in Percent		Effects as a Percentage of U.S. GDP	
	Exports	Imports	Exports	Imports	Exports	Imports
<b>Standard Methodology</b>						
1994	1.1	0.9	2.2	1.9	0.016	0.014
1995	2.0	2.9	4.7	4.9	0.029	0.040
1996	3.8	4.2	7.2	6.1	0.052	0.057
1997	5.6	5.4	8.6	6.8	0.074	0.071
1998	6.9	6.4	9.5	7.2	0.086	0.080
1999	8.4	7.5	10.8	7.4	0.101	0.090
2000	10.4	9.1	10.3	7.2	0.120	0.105
2001	10.3	9.4	11.3	7.7	0.118	0.107
<b>Alternative Methodology<sup>a</sup></b>						
1994	4.8	2.5	10.4	5.2	0.069	0.036
1995	10.8	-3.0	31.3	-4.7	0.152	-0.043
1996	14.4	2.7	34.0	3.8	0.196	0.037
1997	17.9	6.4	33.5	8.0	0.233	0.083
1998	18.3	7.7	30.1	8.9	0.228	0.097
1999	17.9	11.5	25.9	11.8	0.215	0.139
2000	25.4	17.4	29.4	14.6	0.293	0.200
2001	11.8	10.4	13.2	8.6	0.135	0.118

Source: Congressional Budget Office.

Note: By the standard methodology, effects are calculated as the difference, averaged year by year, between the lines labeled "Model with NAFTA" and "Model Without NAFTA" in Figure 11. By the alternative methodology, effects are calculated as the difference, averaged year by year, between the lines labeled "Actual" and "Model Without NAFTA" in Figure C-1.

a. Not corrected for the production and trade shift that occurred in the late 1980s.

0.04 percent of GDP) higher in 1994, fell to \$3.0 billion (0.04 percent of GDP) lower in 1995, and then climbed to \$17.4 billion (0.20 percent of GDP) higher in 2000 before slackening to \$10.4 billion (0.12 percent of GDP) in 2001.

Correcting for the change in the sensitivity of imports to the real exchange rate would lead to a more smoothly increasing positive effect of NAFTA on imports, although there might be some decline in 2001 with the recession. The increases would range from close to 5.2 percent (roughly \$2.5 billion, or 0.04 percent of GDP) in 1994 to roughly 12 percent to 15 percent (about \$14 billion to \$18 billion, or 0.16 percent to 0.21 percent of GDP) in 2001. Those numbers are mostly in a range of roughly

1.5 to 3 times the size of the effects estimated by the standard methodology. Again, they may reflect not only the effects of NAFTA but also part of the increases resulting from the shift in production and trade structure in the late 1980s.

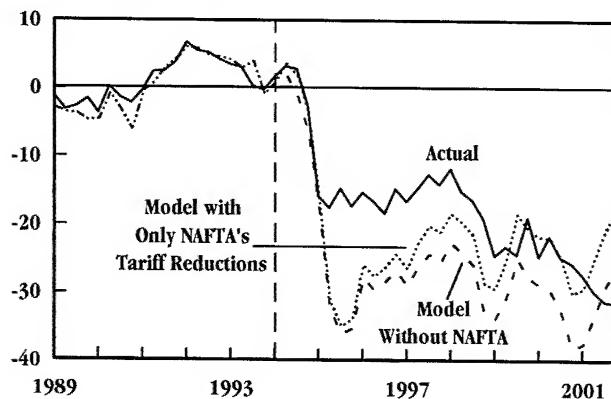
### Effects on the Trade Balance with Mexico

Like the results of the standard methodology, the results of the alternative methodology indicate that NAFTA has had a positive effect on the U.S. goods trade balance with Mexico (as shown by the difference between the "Actual" and "Model Without NAFTA" lines in Figure C-2). The effect is larger than that indicated by the standard methodology and positive in every year rather than in six of the eight post-NAFTA years. Nevertheless, the cumulative

**Figure C-2.**

## U.S. Goods Trade Balance with Mexico by CBO's Alternative Methodology

(In billions of dollars)



Source: Congressional Budget Office using data from the Bureau of the Census for the actual trade balance and projections from CBO's model for other trade balances.

Note: The dashed vertical line marks the beginning of the North American Free Trade Agreement on January 1, 1994.

effect over the eight years is comparatively small. The alternative methodology indicates that NAFTA reduced the cumulative decline in the annual goods trade balance from 1993 through 2001 by 7.4 percent. The comparable figure by the standard methodology was 2.5 percent.

Other than being higher in all post-NAFTA years, the path of the actual trade balance over time is similar to that of the balance in the absence of NAFTA as projected by the alternative model with two exceptions. First, the model indicates a larger decline in the trade balance in 1995 than actually occurred, with the indicated balance remaining substantially lower than the actual balance for several years. Second, the model indicates an increase in the trade balance in 2001, whereas the trade balance actually continued to decline.

Those two exceptions correspond to the two exceptions discussed above in relation to exports and imports; hence, they are at least qualitatively explainable by the same factor—the shift in the structure of U.S.-Mexican production and trade. As noted above, the alternative model predicts a larger decline in exports and larger rise in imports than

actually occurred. It follows that it predicts a larger decline in the trade balance than actually occurred. The model indicates only a slowing of the growth of exports in 2001 rather than the decline that actually took place. It follows that it would also predict a smaller decline in the trade balance than actually happened, or that it might even predict an increase. Excluding those two exceptions, one is left with a gradually increasing positive difference between what the trade balance actually was with NAFTA and what the model indicates the balance would have been in the absence of NAFTA.

Although the estimated effects of NAFTA on both exports and imports may be too high because of the inclusion of increases resulting from the shift in production and trade structure, the same is not necessarily the case for the estimated effects on the trade balance. When imports are subtracted from exports to obtain the balance, the error in the imports tends to cancel out the error in the exports. The errors may or may not cancel each other exactly. If they do, then the trade balance in the absence of NAFTA as projected by the model is correct, and so are the estimated effects of NAFTA as calculated by the standard methodology. If they do not, then the trade balance projected by the model is somewhat in error in one direction or the other (depending on the relative magnitudes of the export and import errors), and so are the estimated effects of NAFTA on the trade balance by the alternative methodology.

By the uncorrected alternative methodology, NAFTA increased the U.S. goods trade balance with Mexico by \$2.3 billion (0.03 percent of GDP) in 1994; by a much larger \$13.8 billion (0.19 percent of GDP) in 1995; by smaller amounts declining slowly to \$8.1 billion (0.09 percent of GDP) in 2000; and by only \$1.4 billion (0.02 percent of GDP) in 2001 (see Table C-2). Correcting for the changes in trade sensitivities resulting from the shift in production and trade structure would at least partially, and perhaps completely, smooth out the fluctuations in the estimates. The result would be an upward and possibly smooth trend over time from roughly \$2 billion (0.03 percent of GDP) in 1994 to roughly \$5 billion to \$10 billion (in the neighborhood of 0.1 percent of GDP) in 2001. The positive effects from 1995 through 1997 would be substantially smaller than those in Table C-2, and the decline in 2001, if any, would also be much smaller than

**Table C-2.****Effects of NAFTA on the U.S. Goods Trade Balance with Mexico by CBO's Standard and Alternative Methodologies**

	Standard Methodology		Alternative Methodology <sup>a</sup>	
	Effects in Billions of Dollars	Effects as a Percentage of U.S. GDP	Effects in Billions of Dollars	Effects as a Percentage of U.S. GDP
1994	0.1	0.002	2.3	0.033
1995	-0.8	-0.012	13.8	0.195
1996	-0.4	-0.006	11.7	0.159
1997	0.2	0.003	11.5	0.150
1998	0.5	0.006	10.5	0.132
1999	0.9	0.011	6.3	0.076
2000	1.3	0.015	8.1	0.093
2001	0.9	0.010	1.4	0.017

Source: Congressional Budget Office.

Note: By the standard methodology, effects are calculated as the difference, averaged by year, between the lines labeled "Model with NAFTA" and "Model Without NAFTA" in Figure 11. By the alternative methodology, effects are calculated as the difference, averaged year by year, between the lines labeled "Actual" and "Model Without NAFTA" in Figure C-2.

a. Not corrected for the production and trade shift that occurred in the late 1980s.

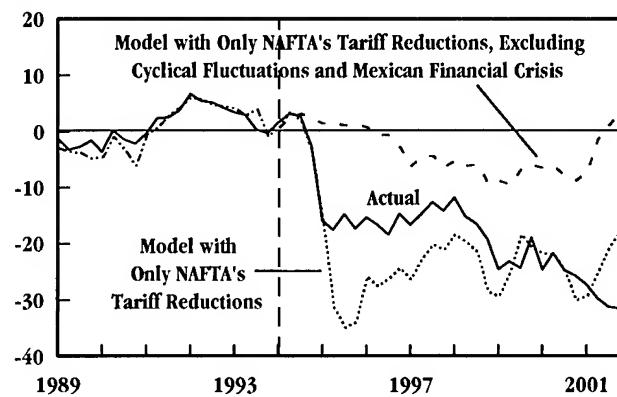
that in the table. The effects in all years (with the possible exception of 2001) would be larger than those indicated by the standard methodology.

Simulations from the alternative model support the conclusion from the standard model that the substantial decline in the U.S. goods trade balance with Mexico is explained by the Mexican financial crisis and U.S. and Mexican cyclical fluctuations (see *Figure C-3*). As noted above, the alternative model cannot make projections of the balance in the presence of all of the provisions of NAFTA. Therefore, the simulations of the balance with NAFTA under the two scenarios in Figure 12 in Chapter 3 must be replaced with simulations of the balance with NAFTA tariff reductions under the two scenarios. That being the case, the effects of NAFTA's nontariff provisions are excluded. Because Mexico had more nontariff trade barriers to eliminate than did the United States when NAFTA began, including those effects should increase the positive effect of NAFTA on the balance and thereby strengthen the results presented here.

Note that under the scenario with no Mexican financial crisis and no U.S. or Mexican cyclical fluctuations, the decline in the trade balance is mostly eliminated and the balance actually recovers by the end of 2001 to a level

**Figure C-3.****U.S. Goods Trade Balance with Mexico Under Alternative Scenarios by CBO's Alternative Methodology**

(In billions of dollars)



Source: Congressional Budget Office using data from the Bureau of the Census for the actual trade balance and projections from CBO's model for other trade balances.

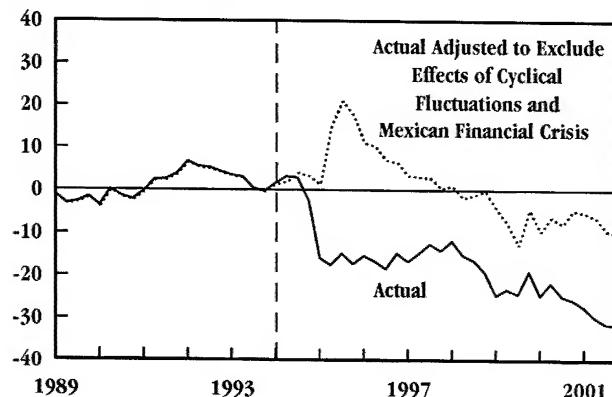
Note: The dashed vertical line marks the beginning of the North American Free Trade Agreement on January 1, 1994.

higher than the one it had just before NAFTA went into effect. The drastic decline in 1995 is completely elimi-

**Figure C-4.**

## Actual U.S. Goods Trade Balance with Mexico Under Alternative Scenarios by CBO's Alternative Methodology

(In billions of dollars)



Source: Congressional Budget Office using data from the Bureau of the Census for the actual balance and calculations based on the census data and projections from CBO's model for the adjusted actual balance.

Note: The dashed vertical line marks the beginning of the North American Free Trade Agreement on January 1, 1994.

nated, and the balance drifts downward only slowly to roughly a \$10 billion deficit by the end of 1998. It remains near that level for two years and then recovers to surpluses in 2001. The \$10 billion deficits projected for 1999 and 2000 are roughly one-half to one-third of the deficits that actually prevailed in those years and, similarly, one-half to one-third of the deficits projected by the model for the scenario with the actual historical values of the real exchange rate, U.S. GDP, and the Mexican industrial production index. Other simulations (not shown), in which slower growth of U.S. GDP was assumed, produced higher trade balances than those presented here.

Another way of viewing what the trade balance would have looked like in the absence of the Mexican financial crisis and the U.S. and Mexican cyclical fluctuations is to adjust the actual balance over time by the difference between the lines for the two model solutions in Figure C-3 to create what could be called "Actual Balance Adjusted to Exclude Effects of Cyclical Fluctuations and Mexican Financial Crisis" (see Figure C-4). That measure does not drop into deficit until mid-1998, and even then the deficits that it indicates remain substantially smaller than those that

actually prevailed in the presence of the Mexican financial crisis and the U.S. and Mexican cyclical fluctuations.

The substantial rise in the balance in 1995 and 1996 by that measure is undoubtedly a figment of the fact that the model reflects the higher sensitivities of trade to the real exchange rate that prevailed before the shift in production and trade structure in the late 1980s. As already noted, those higher sensitivities cause the model to project too large a decline in the balance in response to the peso crash and associated Mexican recession. As a result, the difference between the projections with and without the crash and recession is too large, causing the adjusted actual balance to be too high.

Another effect of the model's incorporation of the older, higher sensitivity to the real exchange rate is that other

**Table C-3.**

## Effects of NAFTA on U.S. Gross Domestic Product by CBO's Standard and Alternative Methodologies

	Effects in Billions of Dollars	Effects in Percent
<b>Standard Methodology</b>		
1994	0.1 - 0.4	0.001 - 0.005
1995	0.1 - 0.7	0.001 - 0.010
1996	0.2 - 1.3	0.002 - 0.018
1997	0.3 - 2.0	0.004 - 0.026
1998	0.3 - 2.4	0.004 - 0.030
1999	0.4 - 3.0	0.005 - 0.035
2000	0.5 - 3.6	0.006 - 0.042
2001	0.5 - 3.6	0.006 - 0.041
<b>Alternative Methodology<sup>a</sup></b>		
1994	0.2 - 1.7	0.003 - 0.024
1995	0.5 - 3.8	0.008 - 0.053
1996	0.7 - 5.0	0.010 - 0.069
1997	0.9 - 6.3	0.012 - 0.082
1998	0.9 - 6.4	0.011 - 0.080
1999	0.9 - 6.3	0.011 - 0.075
2000	1.3 - 8.9	0.015 - 0.103
2001	0.6 - 4.1	0.007 - 0.047

Source: Congressional Budget Office.

a. Not corrected for the production and trade shift that occurred in the late 1980s.

simulations (not shown) do not indicate that the peso crash itself had a comparatively minor effect on the trade balance as it did according to the simulations from the standard methodology. Rather, they indicate that the real exchange rate and U.S. and Mexican cyclical fluctuations all played significant roles in the decline of the trade balance.

### **The Effects of NAFTA on U.S. GDP**

Even more than was the case for the standard methodology, a precise estimate of the effects of NAFTA on U.S. GDP is not possible using the alternative methodology—only an order-of-magnitude estimate can be obtained.

Applying the range of cost ratios used with the standard methodology—somewhere between 5 cents and 35 cents for each \$1 loss of exports—to NAFTA's effects on exports as estimated by the alternative model gives increases in annual U.S. GDP of a few billion dollars, or a few hundredths of a percent (*see Table C-3 on page 47*). Because the estimates of effects on exports by the alternative methodology were mostly in a range of roughly 2.5 to 5 times the estimates by the standard methodology, the same is true for the estimates of effects on GDP. Excluding the increases in exports that resulted from the shift in production and trade structure would most likely lower the estimates presented in Table C-3.

## D

## Effects of the Assumption About the Real Exchange Rates and Incomes in the Absence of NAFTA

Producing simulations of exports and imports in the absence of the North American Free Trade Agreement requires making an assumption about what the values of the real dollar/peso exchange rates, real U.S. gross domestic product, and the Mexican industrial production index would have been in the absence of the agreement. The assumption used in this paper is that those variables would have had the same values in the absence of NAFTA that they actually had in the presence of NAFTA. In general, one would expect NAFTA to have affected the real exchange rates, U.S. GDP, and Mexican industrial production by amounts that are not precisely known. However, the true values of those variables in the absence of NAFTA should not be far different from the values in the presence of NAFTA, and the error introduced by using the latter values in place of the former should be very small. In the case of exports, the error should be such as to attribute smaller positive effects to NAFTA than it actually has had. In the case of the trade balance, the error should cause the effects attributed to NAFTA to be less positive or more negative than the agreement's actual effects. The direction of the error for imports is unclear.

The effects of the assumption with regard to GDP and industrial production can be dispensed with fairly quickly. The effects of NAFTA on the real incomes of the United States and Mexico are both positive, which means that the actual effects of NAFTA on both U.S. exports to Mexico and imports from Mexico are larger than those indicated by the model with the assumption that NAFTA

had no effect on U.S. GDP and Mexican industrial production (since increased Mexican industrial production causes higher Mexican demand for U.S. exports and increased U.S. GDP causes higher U.S. demand for imports). The increase in U.S. GDP is very small—less than 1 percent. Consequently, the effect of that increase on U.S.-Mexican trade is trivially small and would not even be visible in the simulation plots in this paper. (Simulation plots relating to exports would not be affected because U.S. exports are not a function of U.S. GDP.)

The predicted effect of NAFTA on Mexican income is larger in percentage terms than is the predicted effect on U.S. income. Just before NAFTA went into effect, predictions from models were that the agreement would increase Mexican real GDP by amounts ranging from 3 percent to 12½ percent (excluding cumulative effects on growth rates of productivity over long periods of time), and growth of industrial production should not be drastically different from growth of real GDP.<sup>1</sup> The predictions for GDP concerned equilibrium effects over a longer period of time than has yet elapsed, so the actual effects to date are probably smaller. Nevertheless, the actual effects on GDP, and hence on industrial production, might in turn produce effects on U.S. exports to Mexico and therefore on the trade balance with Mexico that might be visible

1. See Congressional Budget Office, *Estimating the Effects of NAFTA: An Assessment of the Economic Models and Other Empirical Studies* (June 1993), p. 5.

in simulation plots in this paper. They should not be large, however.

Because the NAFTA-induced increase in Mexican industrial production has a larger positive effect on U.S. exports to Mexico than the NAFTA-induced increase in U.S. GDP has on U.S. imports from Mexico, the net result of considering those increases would be to project larger positive effects of NAFTA on the U.S. trade balance with Mexico than are projected under the assumption used (and to reduce or eliminate any negative effects projected under that assumption).

The analysis of the real exchange rates is a little more complicated, but the effect of NAFTA on the real value of the peso is also most likely positive. The increase in the trade balance indicated by the model as an effect of NAFTA would cause an increase in the demand for the dollar relative to the peso and therefore put downward pressure on the real value of the peso. However, NAFTA's elimination of Mexican restrictions on foreign investment would mean more investment flows going into Mexico, which would increase the demand for the peso relative to the dollar and therefore put upward pressure on the peso.

Overall, one would expect NAFTA and the preceding trade and other economic liberalization in Mexico to lead to more-rapid economic development and improve the attractiveness of Mexico as a place to invest. Developing countries that begin to grow rapidly usually see their investment rise faster than their saving, leading to increases in inflowing foreign investment that cause their real ex-

change rates to rise and put downward pressure on their trade balances. Except for the extremely aberrant years of the peso crash and subsequent Mexican recession, market pressures have indeed been pushing the real value of the peso steadily higher over the past 15 years. From 1997 through 2001, it was at record high levels and continuing to rise.

If NAFTA has indeed increased the real value of the peso, that increase has caused a rise in U.S. exports to Mexico, a decline in U.S. imports from Mexico, and an increase in the U.S. trade balance with Mexico (all three relative to what they would have been without the real increase in the peso). Those effects of NAFTA would not be captured by CBO's methodology.

Since NAFTA's effects on the real exchange rates and its combined effects on U.S. GDP and Mexican industrial production both lead to larger effects on U.S. exports to Mexico and on the trade balance with Mexico, it can be said with reasonable confidence that NAFTA's actual effects on exports and the trade balance are larger (or, in the case of negative effects on the balance, less negative or even positive) than those projected by the model with the assumption of no effects of NAFTA on GDP and the real exchange rates. Since the effects of NAFTA on GDP and the real exchange rates have effects on U.S. imports from Mexico that go in opposite directions, it is unclear whether the actual effects of NAFTA on imports are larger than, smaller than, or the same as those projected by the model with the assumption of no effects on GDP and the real exchange rates.